84698

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Ninth Avenue Dump
Gary, Indiana

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the Ninth Avenue Dump site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based on the contents of the administrative record for the Ninth Avenue Dump site. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

The State of Indiana is expected to concur with the selected remedy.

DESCRIPTION OF THE REMEDY

This remedial action is the second and final of two operable units for the site. The first operable unit addressed an oil layer floating on the groundwater through oil extraction, storage, and containment with a soil/bentonite slurry wall. The final remedy addresses all remaining threats at the site, including contaminated soils, fill materials, stored oil, groundwater, surface water and sediment.

The major components of the selected remedy include:

- excavation of approximately 36,000 cubic yards of oil contaminated waste and fill down to the native sand,
- thermal treatment of excavated fill and extracted oil, most likely in a mobile on-site incinerator,
- removing debris and contaminated sediments from on- and off-site surface water bodies,
- filling the excavated area with treatment process residuals, trench spoils and pond sediments and debris,
- covering the area contained by the slurry wall with a RCRA Subtitle C cap,
- extraction, treatment and reinjection of contaminated groundwater inside the slurry wall to promote soil flushing,

- discharge of a small quantity of groundwater outside the slurry wall to compensate for infiltration,
- deed and access restrictions to prohibit use of groundwater under the site and protect the cap, and
- long term groundwater monitoring.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable, or relevant and appropriate, to this remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

June 30th, 1989
Date

Valdas V. Adamkus
Regional Administrator
Region V

RECORD OF DECISION SUMMARY
NINTH AVENUE DUMP

I. SITE NAME, LOCATION AND DESCRIPTION

Ninth Avenue Dump is an inactive chemical and industrial waste disposal site located at 7537 Ninth Avenue in Gary, Indiana (see Figure 1). The site is a seventeen acre parcel in an area of mixed industrial, commercial, and residential use approximately 1/8 mile east of Cline Avenue.

Immediately surrounding the site are vacant, privately owned properties. The property to the west is a lot where hazardous wastes were allegedly buried. This property, referred to as the Ninth and Cline site, was scored but not placed on the National Priorities List (NPL). Approximately 1/4 mile south of the site is an NPL site, MIDCO I, and an Indiana Department of Highways (IDOH) maintenance facility. A remedial Investigation/Feasibility Study (RI/FS) is ongoing at MIDCO I, and the Record of Decision will be completed during the third quarter of 1989.

The nearest residential area is approximately 1/8 mile west of the site, on the west side of Cline Avenue. The site is approximately 1/4 mile south of the Grand Calumet River and 1 3/4 mile north of the Little Calumet River.

Ninth Avenue Dump is located in a low-lying area with poor drainage. Prior to filling, the site consisted of parallel ridges separated by wetlands areas. Currently, the site is relatively flat with small depressions and mounds remaining from waste disposal or cleanup activities. Interconnected ponds and wetlands areas surround waste disposal areas in the north, west and south. The wetlands areas to the east and south of Ninth Avenue Dump are relatively undisturbed and serve as habitat for fish, migratory birds, and other wildlife.

Figure 2 is a map showing existing site conditions. The only structures currently on the site are a fence surrounding the contaminated area and a fenced decontamination area including two 5,000 gallon water storage tanks built during the RI/FS.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Hazardous waste disposal occurred at the site from the early to mid 1970s, with some filling, believed to be associated with cleanup activities, continuing until 1980. The site operator accepted dry industrial, construction and demolition waste such as ashes, broken concrete, bricks, trees, wood, tires, cardboard, paper and car batteries. The site also received liquid industrial waste including oil, paint solvents and sludges, resins, acids and other chemical wastes including flammable, caustic and arsenic contaminated materials. A small-scale auto wrecking operation had reportedly been observed at the property.

NOTE

SITE LOCATION MAP WAS REPRODUCED FROM THE U.S.G.S. 7.5 MINUTE QUAD. MAP, HIGHLAND, INDIANA, 1968, PHOTO REVISED 1980. REFER TO STANDARD U.S.G.S. TOPOGRAPHIC MAP SYMBOLS.

LEGEND

— — — APPROXIMATE PROPERTY BOUNDARY

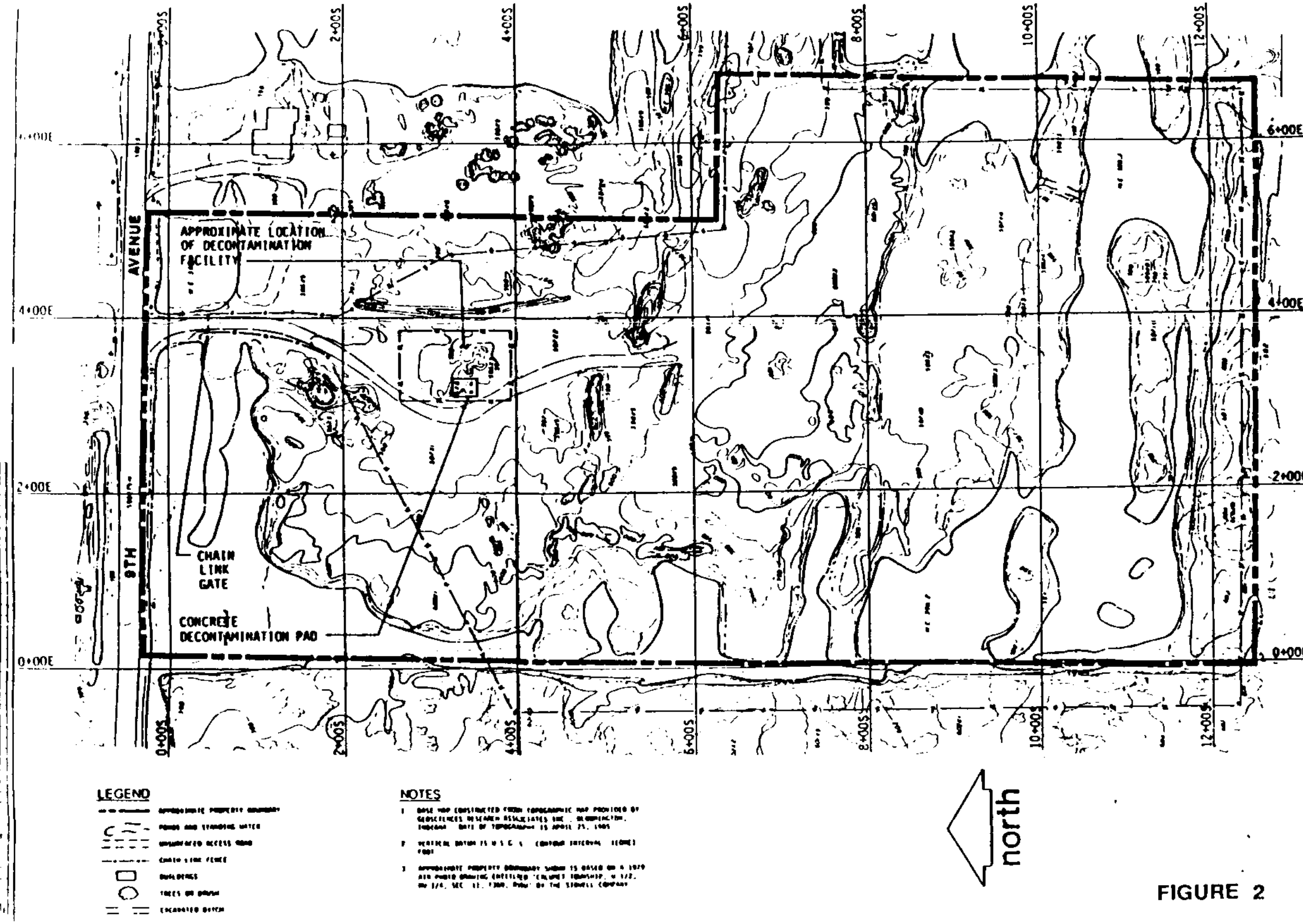
north

SCALE: 1" = 2000'

FIGURE 1

WARZYN	SITE LOCATION MAP REMEDIAL INVESTIGATION 9TH AVENUE DUMP SUPERFUND SITE PART OF NW 1/4 OF SECTION 11, ... R9W CITY OF GARY, LAKE COUNTY, INDIANA

DWN SJP	APP'D	DATE 6-9-88	C12912-A5



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- PONDS AND STANDING WATER
- UNSURFACED ACCESS ROAD
- CHAIN LINK FENCE
- BUILDINGS
- TREES OR BRUSH
- EXCAVATED DITCH

NOTES

1. BASE MAP CONSTRUCTED FROM TOPOGRAPHIC MAP PROVIDED BY GEOSCIENCES RESEARCH ASSOCIATES INC., BLOOMINGTON, INDIANA. DATE OF TOPOGRAPHY IS APRIL 25, 1985.
2. VERTICAL DATUM IS U.S.G.S. CONTOUR INTERVAL (ONE) FOOT.
3. APPROXIMATE PROPERTY BOUNDARY SHOWN IS BASED ON A 1979 AIR PHOTO DRAWING ENTITLED "CALUMET TOWNSHIP, N 1/2, NW 1/4, SEC 12, T36N, R9W" BY THE SIDWELL COMPANY.

FIGURE 2

EXISTING SITE FEATURES

PHASED FEASIBILITY STUDY
HYDROCARBON LAYER OPERABLE UNIT
NINTH AVENUE DUMP
GARY, INDIANA

WARZYN

TDH

RLM

6-16-88

1" = 100'

13232 B2

WARZYN

In 1975, the Indiana State Board of Health (ISBH) inspected the site. The inspection documented the existence of approximately 10,000 55-gallon drums at the surface, many of which were empty. Evidence was also found that liquid wastes had been dumped on-site. A State inspector estimated that approximately 500,000 gallons of liquid industrial waste had been dumped and 1,000 drums had been buried on-site. Subsequent inspections revealed portions of discarded auto batteries, drummed liquid wastes and abandoned tanker trucks.

In 1975 and 1980, the site operator, Mr. Steve Martell, was ordered by ISBH and the United States Environmental Protection Agency (EPA), respectively, to initiate surface cleanups. In 1983, the site was placed on the National Priorities List and a Partial Consent Judgement was signed between U.S. EPA and Mr. Martell. The Consent Judgement required Mr. Martell to evaluate surface and subsurface conditions and submit a plan for remedial action. During this period, Mr. Martell removed drums, tank cars and some contaminated soils from the surface of the site. In early 1985, when Mr. Martell appeared to have insufficient funds to perform the investigations required under the Consent Judgement, U.S. EPA took over performance of the RI/FS.

In early 1988, Mr. Martell provided information on generators at the Ninth Avenue site. Based on this information, General Notice Letters were sent to approximately 240 potentially responsible parties (PRPs) on March 9, 1988. Special Notice Letters for performance of the remedial design/remedial action (RD/RA) for the first operable unit were sent to approximately 180 PRPs on July 9, 1988. When PRPs and U.S. EPA were unable to negotiate a settlement, EPA issued a Unilateral Administrative Order for the RD/RA on December 7, 1988. Approximately 75 PRPs agreed to comply with the Order on January 13, 1989.

Special Notice Letters for the final remedy RD/RA were issued on March 17, 1989. The deadline for receipt of a "good faith offer" from the PRPs is May 26, 1989. A "good faith offer" was not received by that date.

III. COMMUNITY RELATIONS HISTORY

Public meetings have been held on August 13, 1986, July 13, 1988 and March 29, 1989 to discuss RI/FS activities, the remedial alternatives considered and the remedial alternative recommended by EPA. The proposed plan and administrative record were made available to the public on March 20, 1989, which marked the start of a 30-day public comment period. Public comments and responses to those comments are contained in the Responsiveness Summary (Appendix B).

IV. SCOPE AND ROLE OF THE RESPONSE ACTION

This Record of Decision (ROD) addresses the second of two operable units. The first operable unit ROD, signed on September 20, 1988, addressed remediation of an oil layer floating on the groundwater surface. The first ROD called for pumping and storage of the oil layer, construction of a slurry wall around the contaminated portion of the site, limited groundwater treatment, and groundwater monitoring.

This ROD addresses the remaining threats at the site. These include contaminated soils, sediments, fill materials, and groundwater, as well as the oil collected under the first operable unit.

V. SITE CHARACTERISTICS

Waste And Soils

Buried wastes at the site include foundry sand, wood, concrete, bricks, metals, slag, non-containerized liquids and sludges, and drummed liquid and solid material. Based on test pit observations, it has been estimated that 1,000 to 2,000 drums remain buried at the site. Depth of fill ranges from approximately 0 to 10 feet. Due to the high groundwater table (approximately 5 feet), buried waste is in contact with the groundwater. Test pit observations indicate that most of the filling occurred in the central and southern portions of the site. Filling appears to have stopped at the ponded area in the southern portion of the site, where partially covered waste can be observed in the ponds.

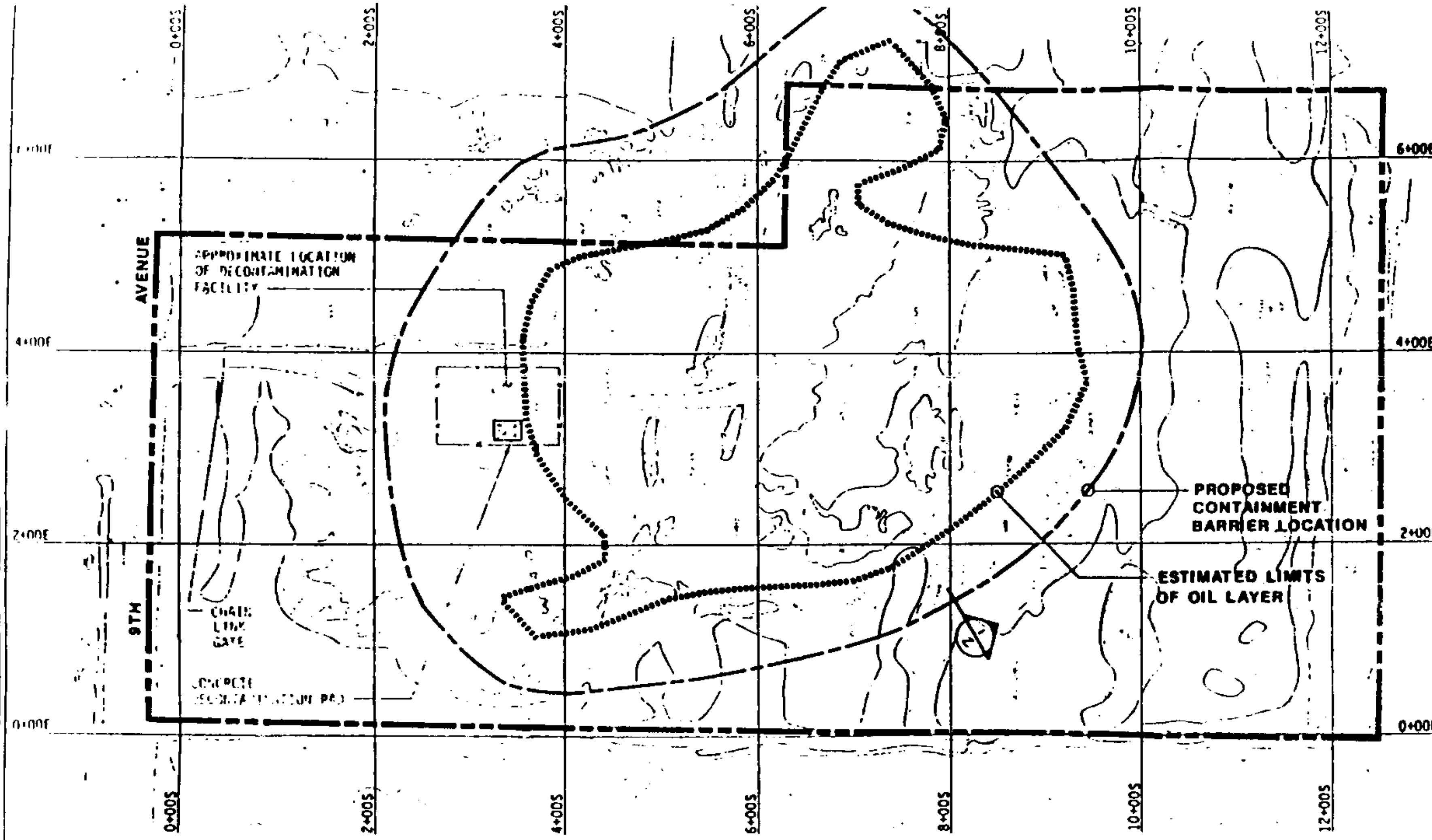
Surface and subsurface soil contamination levels are summarized in Appendix A. Soils show contamination with a variety of ketones, chlorinated ethanes, benzene, ethylbenzene, toluene and xylene (BETX), polynuclear aromatic hydrocarbons (PAHs), phenols, pesticides, polychlorinated biphenyls (PCBs), plasticizers and dioxins/furans. Highest concentrations of organic contaminants were generally found in the center of the site, which coincides with the location of the waste disposal areas. Metals did not show any clearly defined spatial patterns. Liquids in salvaged drums from test pits were also tested and determined to contain the same contaminants found in waste and soil samples.

Surface Water and Sediments

On- and off-site surface water bodies did not show high levels of contamination nor high frequency of detection. However, low levels of volatile organic compounds (VOCs), PAHs, pesticides, and metals were found in the surface water and sediments. Appendix A contains a summary of surface water and sediment data.

Oil Layer

An oil layer is floating on the groundwater surface approximately five feet below the ground. Observed oil layer thicknesses varied from 0.25 to 3.8 feet as measured in five on-site monitoring wells. The estimated lateral extent of the oil layer covers approximately 30 to 50 percent of the site area and encompasses the central and south central portions of the site (see Figure 3). The quantity of oil under the site is estimated



LEGEND

- ESTIMATED LIMITS OF OIL LAYER
- PROPOSED CONTAINMENT BARRIER LOCATION

NOTES

1. REFER TO DRAWING 13232-B2 FOR ADDITIONAL NOTES AND LEGEND
2. REFER TO FIGURE 3, SHEET 2 FOR BARRIER SECTION DETAIL

north

FIGURE 3

ALTERNATIVE 2: CONTAINMENT-LAYOUT

PHASED FEASIBILITY STUDY
HYDROCARBON LAYER OPERABLE UNIT
NINTH AVENUE DUMP
GARY, INDIANA

WARZYN

1" = 100'

13232 B3

at 250,000 to 700,000 gallons, of which 100,000 to 500,000 gallons is estimated to be recoverable. Analysis of oil samples indicate the presence of chlorinated hydrocarbons, PAHs, PCBs, as well as low levels of dioxins and furans. Concentrations of contaminants are higher than in any other medium and the oil appears to be a major source of groundwater contamination. Analytical results for the oil layer are summarized in Appendix A.

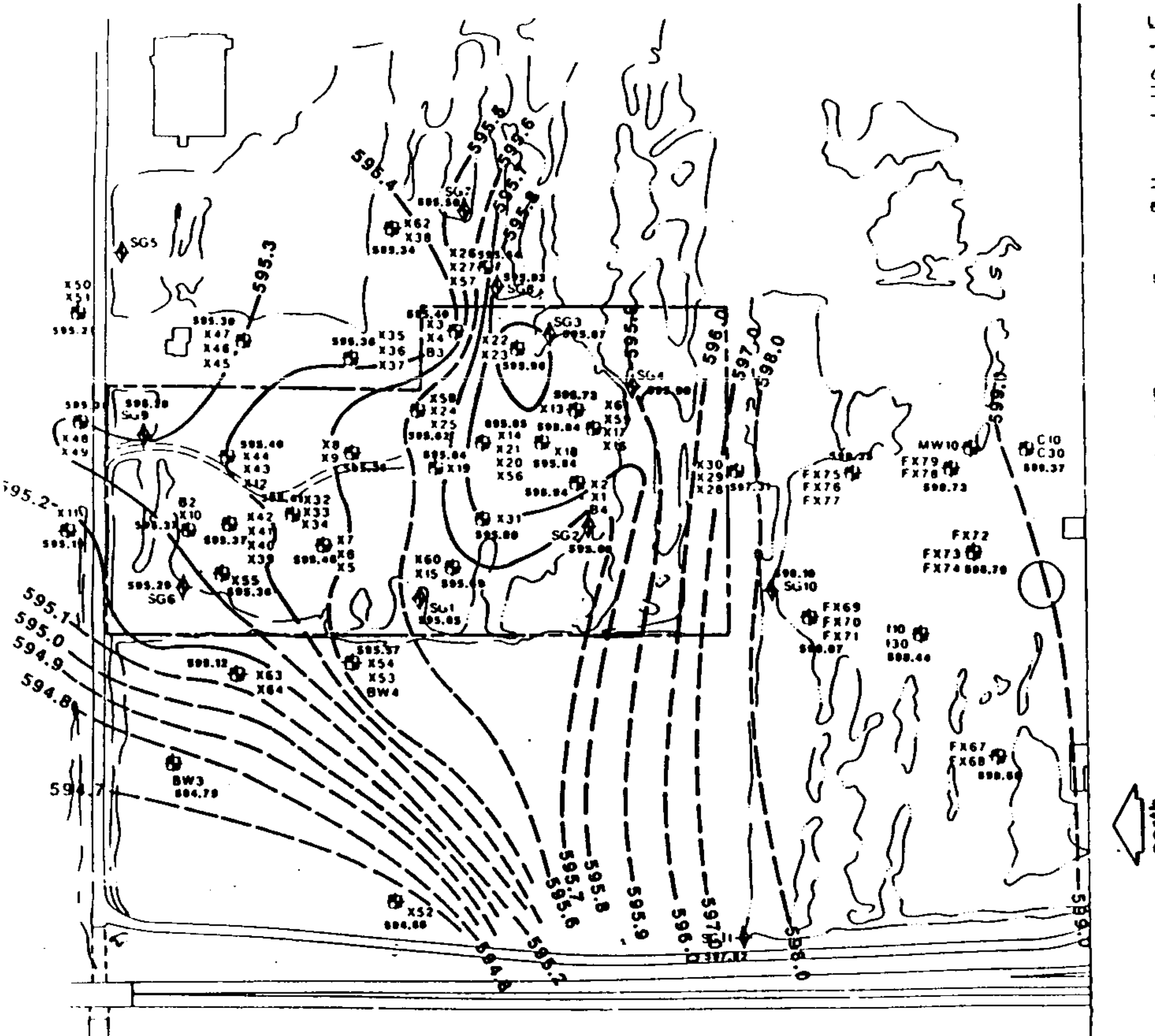
Groundwater

The shallow aquifer under the site is part of the Calumet Aquifer, which consists of 30 feet of coarse sand and extends from the Little Calumet River to Lake Michigan. This is underlain by a 90 - 100 foot clay aquitard. At the site, groundwater is typically found within five feet of the surface. Groundwater flow velocities are very slow due to the low hydraulic gradient in the area, ranging from 0.27 feet per day (ft/day) at the southern portion of the site to 0.02 ft/day near Ninth Avenue. Groundwater flow is generally to the north, with ponds at the northwest and northeast corners acting as local groundwater discharge areas. Discharge to leaky sewers also influences local groundwater flow. A Hammond sewer line approximately 1000 feet east of the site appears to act as a local point of groundwater discharge. Surface water discharge to a City of Gary sewer approximately 700 feet west of the site also affects surface water and groundwater flow. A July 1987 water table map is shown in Figure 4.

The shallow water table and permeable soils makes the Calumet Aquifer highly susceptible to contamination from the numerous industrial sources in the area. Preliminary data collected in a survey of the area by the United States Geological Survey (USGS) indicate that low levels of phenols, benzene, and toluene and high total dissolved solids occur in several areas, especially downgradient of steel or petrochemical industries.

Groundwater under the site is contaminated with approximately 100 organic and inorganic compounds including many of the compounds found in the oil layer (see Appendix A). Concentrations were as high as 2,300,000 ug/l total VOCs. Because of the low gradients in the area, groundwater contamination has not, for the most part, migrated beyond the site boundaries, except on the eastern side of the site. A typical isoconcentration map of groundwater contaminants is shown in Figure 5.

Groundwater contamination on-site is complicated by a plume of high dissolved solids at the bottom of the aquifer from an off-site source. Chloride concentrations were as high as 16,000 mg/l immediately upgradient (south) of the site and decreased to approximately 100 mg/l to the north of the site. Based on this finding, a limited off-site groundwater investigation was done at the IDOH facility to the south of the site, where chloride concentrations as high as 46,000 mg/l were found. An isoconcentration map of chlorides at the bottom of the aquifer is shown in Figure 6.



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- PONDS AND STANDING WATER
- UNSURFACED ACCESS ROAD
- CHAIN LINK FENCE
- BUILDINGS
- TREES OR BRUSH
- EXCAVATED DITCH
- B4 X2 BW4 — MONITORING WELL LOCATION AND NUMBER
- SG8 — STAFF GAGE LOCATION AND NUMBER
- 599.37 — GROUNDWATER ELEVATION
- 595.0 — WATER TABLE CONTOUR (DASHED WHERE INFERRED) (CONTOUR INTERVAL = 0.10 FT. NORTH OF SG4) (CONTOUR INTERVAL = 1.0 FT. SOUTH OF SG4)

NOTES

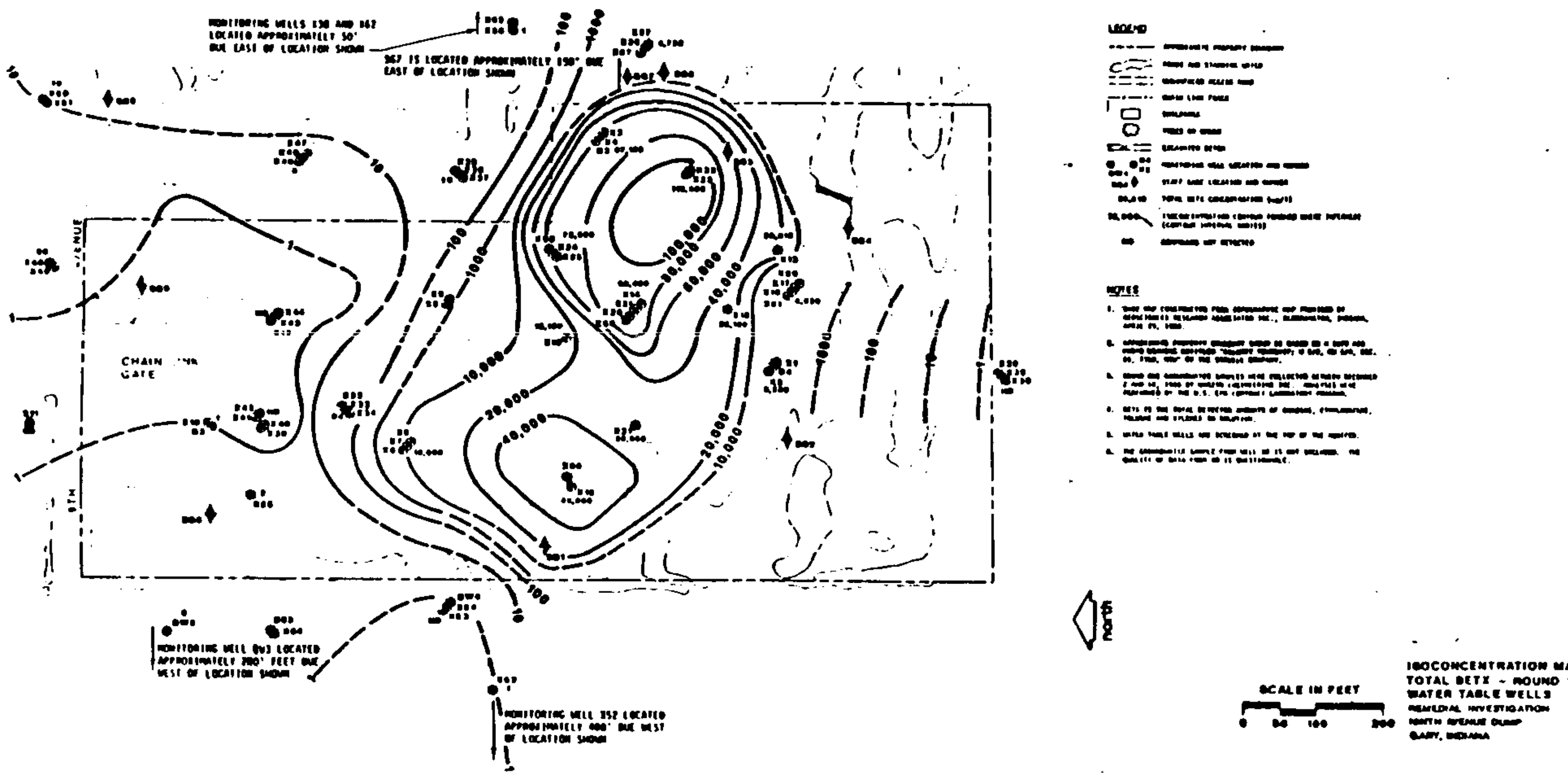
1. WATER TABLE ELEVATIONS SHOWN ARE FROM MEASUREMENTS OBTAINED JULY 7, 1987 BY WARZYN ENGINEERING INC.
2. WATER TABLE ELEVATIONS AT WELLS X8, X14, X19, X31 AND X56 ARE VALUES WHICH HAVE BEEN CORRECTED FOR OIL DENSITY AND THICKNESS.
3. WATER LEVEL AT WELL X8 IS SUSPECTED TO BE INCORRECT DUE TO DIFFICULTIES MEASURING PRODUCT THICKNESS.
4. WATER LEVEL AT WELL X13 WAS NOT USED BECAUSE THE DATA DID NOT FIT IN ANY REASONABLE INTERPRETATION OF GROUNDWATER TABLE CONTOURS.
5. WATER TABLE ELEVATIONS AT WELLS FX72 AND FX75 HAVE BEEN CORRECTED FOR INCREASED DENSITY DUE TO HIGH CHLORIDE CONCENTRATIONS. REFER TO APPENDIX S FOR DISCUSSION OF CHLORIDE CORRECTION.
6. REFER TO FIGURE 11 FOR ADDITIONAL NOTES.
7. MONITORING WELLS MW7, MW10, C10, C30, I10 AND I30 WERE INSTALLED AS PART OF THE MIDCO I RI UNDER THE SUPERVISION OF GEOSCIENCES RESEARCH ASSOCIATES, INC., BLOOMINGTON, INDIANA.

FIGURE 4

Water Table Map
July 7, 1987

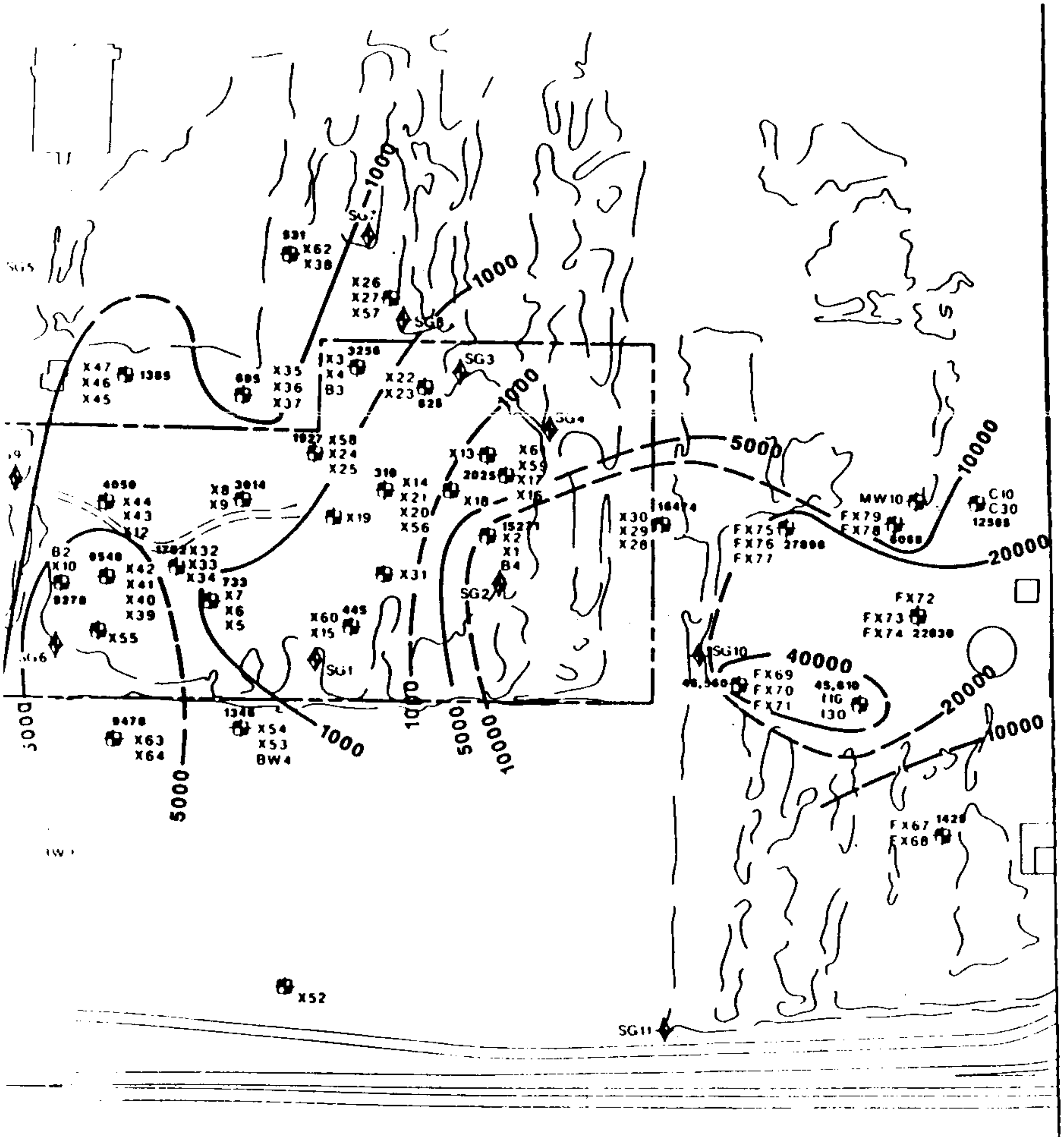
SCALE IN FEET

0 100' 200 400



CHAIN LINK GATE
MONITORING WELLS 130 AND 162 LOCATED APPROXIMATELY 50' DUE EAST OF LOCATION SHOWN
MONITORING WELL 352 LOCATED APPROXIMATELY 400' DUE WEST OF LOCATION SHOWN
100,000
80,000
60,000
40,000
20,000
10,000
1000
100
10
1
LEGEND
NOTES
north
SCALE IN FEET
0
50
100
200
ISOCONCENTRATION MA
TOTAL BETX - ROUND
WATER TABLE WELLS
REMEDIAL INVESTIGATION
NINTH AVENUE DUMP
GARY, INDIANA

FIGURE 5



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- PONDS AND STANDING WATER
- UNSURFACED ACCESS ROAD
- CHAIN LINK FENCE
- BUILDINGS
- TREES OR BRUSH
- EXCAVATED DITCH
- BW4 B4 X2 — MONITORING WELL LOCATION AND NUMBER
- SG8 — STAFF GAGE LOCATION AND NUMBER
- 8068 — TOTAL CHLORIDE CONCENTRATION (mg/l)
- 10,000 — ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED) (CONTOUR INTERVAL VARIES)

NOTES

1. BASE MAP CONSTRUCTED FROM TOPOGRAPHIC MAP PROVIDED BY GEOSCIENCES RESEARCH ASSOCIATES INC., BLOOMINGTON, INDIANA. DATE OF TOPOGRAPHY IS APRIL 25, 1985.
2. APPROXIMATE PROPERTY BOUNDARY SHOWN IS BASED ON A 1979 AIR PHOTO DRAWING ENTITLED "CALUMET TOWNSHIP: W 1/2, NW 1/4, SEC. 11, T36N, R9W" BY THE SIDWELL COMPANY.
3. LOCATION OF WELLS X1 TO X15, B2 TO B4, BW3 AND BW4, FENCING AND THE EXCAVATED DITCH WERE FIELD LOCATED BY WARZYN ENGINEERING INC. SURVEYORS ON MAY 6, 1986.
4. ALL OTHER MONITORING WELLS EXCEPT WELLS X60 THROUGH X64, WERE INSTALLED BY EXPLORATION TECHNOLOGY, INC. (ETI) UNDER THE DIRECTION OF WARZYN ENGINEERING INC. IN OCTOBER AND NOVEMBER 1986 AND WERE FIELD LOCATED BY WARZYN ENGINEERING INC. SURVEYORS ON NOVEMBER 5 AND 6, 1987. WELLS X60 THROUGH X64 WERE INSTALLED BY EXPLORATION TECHNOLOGY, INC. UNDER THE DIRECTION OF WARZYN ENGINEERING INC. FROM JUNE 9-11, 1987 AND WERE FIELD LOCATED BY WARZYN ENGINEERING INC. SURVEYORS ON JUNE 29, 1987.
5. MONITORING WELLS MW7, MW10, C10, C30, I10 AND I30 WERE INSTALLED AS PART OF THE MIDCO I RI UNDER THE SUPERVISION OF GEOSCIENCES RESEARCH ASSOCIATES INC., BLOOMINGTON, INDIANA.
6. VALUES SHOWN ARE FOR MONITORING WELLS SCREENED AT THE BASE OF THE CALUMET AQUIFER.
7. ROUND 2 SAMPLES WERE COLLECTED BY WARZYN ENGINEERING INC. BETWEEN JUNE 2 AND JUNE 17, 1987. ANALYSES WERE PERFORMED BY THE U.S. EPA CONTRACT LABORATORY PROGRAM.

FIGURE 6

north

Chloride Isoconcentration Map
Deep Wells

SCALE IN FEET

0 100 200 4[illegible]

VI. SUMMARY OF SITE RISKS

Although the interim remedy mandated in the first operable unit ROD has not yet been implemented, this section will describe the risks remaining after implementation of the interim remedy, as well as the baseline risk assessment. A summary of the baseline risk assessment is presented in Table 1 and a summary of the risks remaining after implementation of the interim remedy is presented in Table 2.

Summary of Baseline Risk Assessment

The current use scenario showed carcinogenic risks as high as 1.5×10^{-2} for trespassers on the site, mainly due to dermal contact with contaminated surface soils. Contaminants contributing to the majority of this risk are PCBs and PAHs. The site was fenced in 1987 to protect nearby residents from contact with surface soils, however, several holes have been cut in the fence and trespassing remains a persistent problem.

There are approximately 60 industrial and residential water supply wells within one mile of the site. However, none of the wells currently in use are affected by groundwater contamination at the site. The majority of residents in this area receive City of Gary or Hammond water, which is drawn from Lake Michigan. Thus, there is no risk due to groundwater use under the current use scenario.

No significant risk to human health due to contact with surface water was found in the risk assessment, however, some metals and pesticides exceeded federal Ambient Water Quality Criteria (AWQC), indicating potential harm to aquatic life (see Appendix A and Figure 7).

To determine the potential for contaminants in sediments to migrate to surface water and affect aquatic life, an equilibrium partitioning approach was used. This approach predicts contaminant concentrations in interstitial waters using the sediment contaminant concentrations and organic carbon content, and the organic carbon partition coefficient of the contaminant which are then compared to AWQC. Based on this approach, it appears that some sediments may affect aquatic life due to contamination with PCBs and chlordane (see Appendix A).

The future use scenario assumed no action would be taken to restrict access and the site is developed for residential use. If the groundwater under the site were used for drinking and other household uses, users would be exposed to an extremely high carcinogenic risk (greater than 1) and noncarcinogenic risk (hazard index as high as 3000). PAHs, PCBs, benzene, trichloroethylene, and lead are major contributors to this risk.

Future residents would also be exposed to a high carcinogenic risk due to ingestion and dermal contact with surface soils (carcinogenic risk as high as 8×10^{-2}). In addition, sediment analytical data were compared to future use risk scenarios for surface soils, since this approach was

TABLE 1

SUMMARY OF BASELINE RISK ASSESSMENT

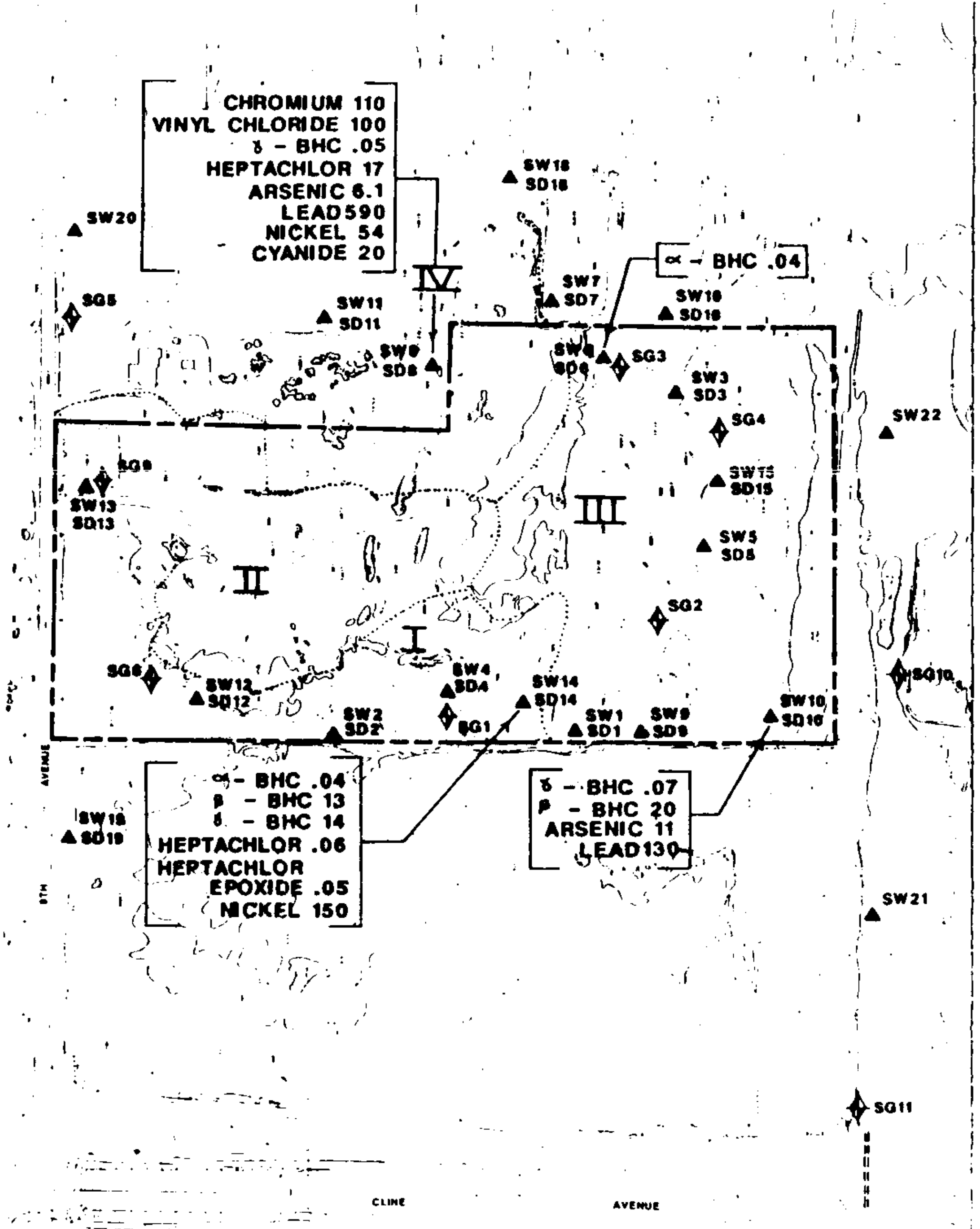
Medium	Pathway	Carcinogenic Risk *		Noncarcinogenic Risk * (Chronic Hazard Index)	
		Max	Mean	Max	Mean
CURRENT USE					
Oil Phase	Inhalation	5.9×10^{-6}	3.2×10^{-6}	<1	<1
Soils	Ingestion	8.8×10^{-5}	4.3×10^{-6}	<1	<1
Soils	Dermal	1.5×10^{-2}	7.5×10^{-4}	<1	<1
FUTURE USE ON-SITE (assumes residential use of site)					
Oil Phase	Inhalation	$5.2.10^{-5}$	3.2×10^{-5}	<1	<1
Groundwater	Ingestion	>1	1.6×10^{-1}	3000	62
Groundwater	Dermal	>1	1.6×10^{-1}	29	1
Groundwater	Inhalation	2×10^{-2}	2.1×10^{-4}	1.8	-
Soils	Ingestion	1.4×10^{-3}	7.2×10^{-5}	<1	-
Soils	Dermal	8.0×10^{-2}	3.9×10^{-3}	<1	-
FUTURE USE OFF-SITE (assumes residential use of adjacent property)					
Groundwater	Ingestion	2.3×10^{-4}	-	755	-

* Risk calculation are based on the following indicator chemicals: benzene, toluene, trichlorethylene, cresols, PAHs, bis (2-ethylhexyl)phthalate, heptachlor, PCBs, nickel, lead, salt.

TABLE 2
SUMMARY OF RISKS REMAINING AFTER IMPLEMENTATION OF THE INTERIM REMEDY (ASSUMING FUTURE RESIDENTIAL USE OF SITE)

Medium	Carcinogenic Risk * Max	Carcinogenic Risk * Mean	Noncarcinogenic Risk * (Hazard Index)
AREA INSIDE SLURRY WALL			
Groundwater	> 1	4.3×10^{-1}	< 1
Soils		4.5×10^{-3}	< 1
AREA OUTSIDE SLURRY WALL			
Groundwater (SE corner)	> 1		< 1
Groundwater (all other areas)	4.3×10^{-5}		< 1
Soils	Below 10^{-7} carcinogenic risk or less than background		

* Risk calculations are based on the following indicator chemicals: benzene, trichlorethylene, vinyl chloride, chloro-benzene, toluene, bis(2-ethylhexyl)phthalate, PAHs, heptachlor, PCBs, arsenic, and lead.



LEGEND

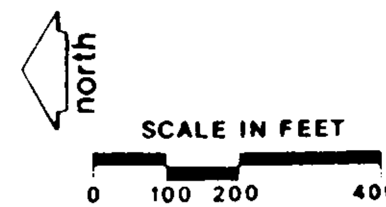
- APPROXIMATE PROPERTY BOUNDARY
- PONDS AND STANDING WATER
- UNSURFACED ACCESS ROAD
- CHAIN LINK FENCE
- BUILDINGS
- TREES OR BRUSH
- SW4 SD4 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION AND NUMBER
- SG4 — STAFF GAGE LOCATION AND NUMBER
- DRAINAGE AREA DELINEATION LINE
- III — DRAINAGE AREA DESIGNATION

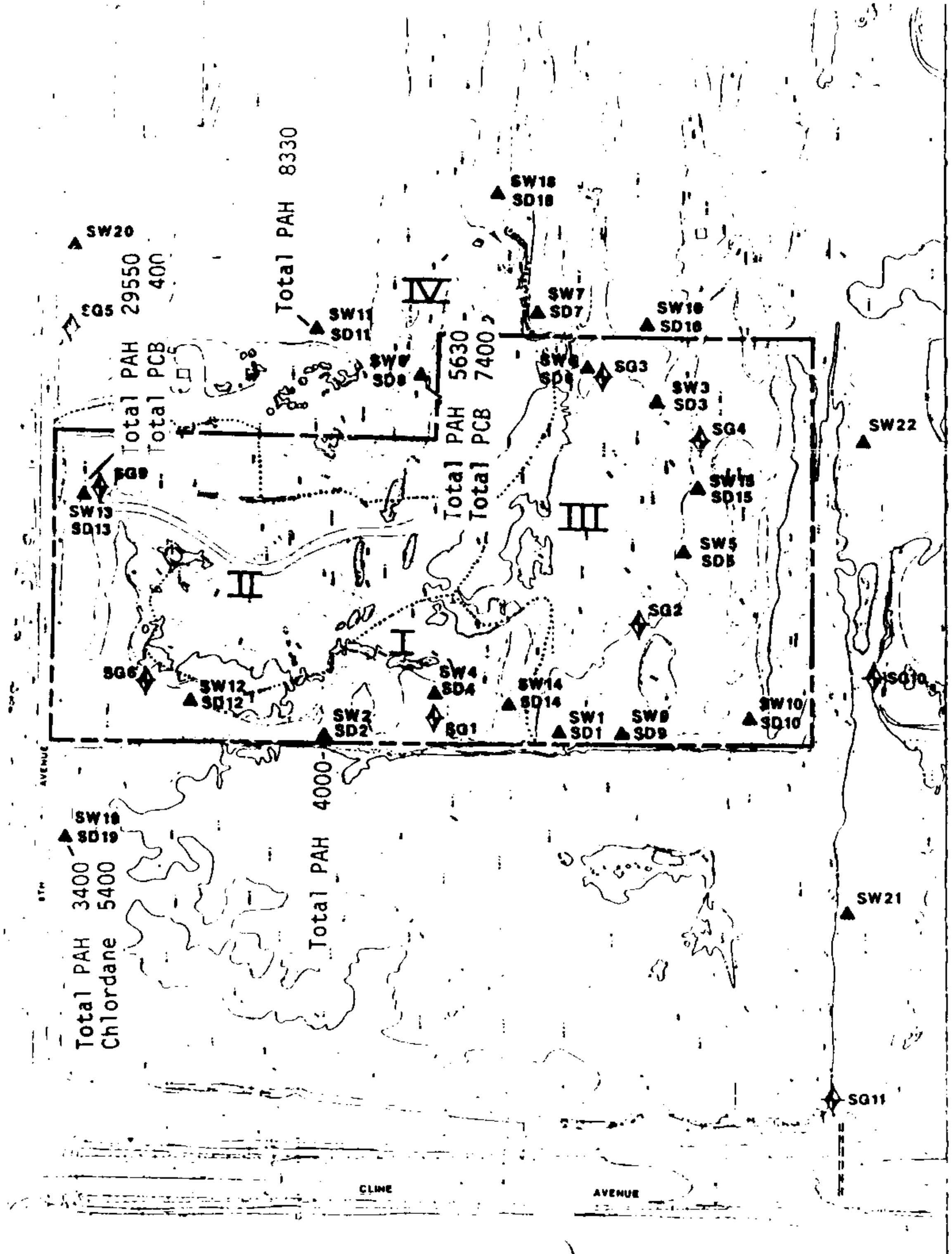
NOTES

1. ALL CONCENTRATIONS ARE IN ug/l.
2. ROUND 1 SURFACE WATER AND SEDIMENT SAMPLES COLLECTED BY WARZYN ENGINEERING INC. AT LOCATIONS SW/SD-1 THROUGH SW/SD-19 FROM OCTOBER 14 TO OCTOBER 16, 1986. LOCATIONS ARE APPROXIMATE AND ARE BASED ON SAMPLING CREW FIELD NOTES.
3. ROUND 2 SURFACE WATER SAMPLES WERE COLLECTED BY WARZYN ENGINEERING INC. AT LOCATIONS SW2, SW3, SW6, SW9 THROUGH SW13, SW15, AND SW20 THROUGH SW22 FROM JUNE 8-10, 1987. LOCATIONS ARE APPROXIMATE.
4. STAFF GAGES WERE FIELD LOCATED BY WARZYN ENGINEERING INC. SURVEYORS ON MAY 6, 1986 AND JUNE 29, 1987.

FIGURE 7

Surface Water Constituents
Exceeding Water Quality Standards
Round 1





APPROXIMATE PROPERTY BOUNDARY

PONDS AND STANDING WATER

UNSURFACED ACCESS ROAD

CHAIN LINK FENCE

BUILDINGS

TREES OR BRUSH

SW4 SD4 SURFACE WATER AND SEDIMENT SAMPLING LOCATION AND NUMBER

SG4 STAFF GAGE LOCATION AND NUMBER

DRAINAGE AREA DELINEATION LINE

III DRAINAGE AREA DESIGNATION

NOTES

1. REFER TO FIGURE 2 FOR ADDITIONAL NOTES.
2. ROUND 1 SURFACE WATER AND SEDIMENT SAMPLES COLLECTED BY WARZYN ENGINEERING INC. AT LOCATIONS SW/SD-1 THROUGH SW/SD-19 FROM OCTOBER 14 TO OCTOBER 16, 1986. LOCATIONS ARE APPROXIMATE AND ARE BASED ON SAMPLING CREW FIELD NOTES.
3. ROUND 2 SURFACE WATER SAMPLES WERE COLLECTED BY WARZYN ENGINEERING INC. AT LOCATIONS SW2, SW3, SW6, SW9 THROUGH SW13, SW15, AND SW20 THROUGH SW22 FROM JUNE 8-10, 1987. LOCATIONS ARE APPROXIMATE.
4. STAFF GAGES WERE FIELD LOCATED BY WARZYN ENGINEERING INC. SURVEYORS ON MAY 6, 1986 AND JUNE 29, 1987.

FIGURE 8

Sediment Sampling Locations
Exceeding Background or Human Health Criteria (ug/

north

SCALE IN FEET

0 100 200 400

used at the nearby Midco I site. Sediments exceed background levels or 1×10^{-6} carcinogenic risk for PAHs, PCBs and pesticides. Sampling locations where sediments exceeded these criteria are shown in Figure 8. Groundwater modeling conducted during the RI showed the nearest residential users (approximately one half mile east of the site) will not be affected by site contaminants in 70 years. However, users of the adjacent property to the east would be exposed to carcinogenic and noncarcinogenic risks if this property were developed for residential use in the future. (A family lived on this property until the early 1980's). Also, contaminants have migrated from groundwater to nearby ponds and would continue to do so if groundwater contamination was not remediated.

Risks Remaining After Implementation of the Interim Remedy

Implementation of the interim remedy will reduce risks due to inhalation of volatiles from the oil phase floating on the groundwater by pumping out the oil that will flow. The oil phase will be surrounded by a slurry wall which will contain the oil and limit migration of contaminants in the oil and groundwater.

Implementation of the interim remedy in effect divides the site risks into three areas: 1) groundwater, oil remaining after extraction, and soils inside the slurry wall; 2) groundwater, soils, surface water and sediments outside the slurry wall; and 3) oil extracted and stored on-site.

Table 2 shows the risks remaining inside the slurry wall, assuming future residential use. Although the slurry wall will limit migration of contaminants, carcinogenic risk due to ingestion of groundwater and soils inside the slurry wall would remain high. Risk calculations assumed that 45% of the oil would remain after extraction.

Risk calculations for the area outside the slurry wall show that most of the contaminated soils will be enclosed by the slurry wall, leaving a minimal risk in areas outside the wall (below 10^{-7} carcinogenic risk or less than background). However, contaminated surface soils within the slurry wall area will remain exposed to trespassers after implementation of the interim remedy.

Because the primary purpose of the slurry wall is to contain the oil phase, some contaminated groundwater will remain outside the wall. Risks due to use of the groundwater at the southeast corner of the wall will be nearly as high as for the water inside the slurry wall. Carcinogenic risk is considerably lower in all other areas; the maximum calculated risk was 4.3×10^{-5}, due to low levels of benzene in the groundwater. A summary of the risk calculation is presented in Table 2.

The interim remedy will also leave some residual risk due to on-site storage of the extracted oil. This risk was not quantified, but would be high only if the storage tanks leaked or spillage occurred.

VII. DESCRIPTION OF ALTERNATIVES

Based on the analysis of contamination and associated risks at the Ninth Avenue Dump site, the following response objectives were identified for the final remedy:

- treat or dispose of oil collected and stored during implementation of the interim remedy,
- reduce or eliminate direct contact with and erosion of contaminated surface soils,
- reduce or eliminate direct contact with and releases to groundwater from contaminants in waste and subsurface soils,
- reduce or eliminate off-site migration of contaminated groundwater and discharge of contaminants from groundwater to surface water,
- reduce or eliminate migration of contaminants from soils and groundwater to surface water and sediments, and remove contaminated sediments, discarded drums and other debris from ponds.

Six alternatives were developed to address these response objectives. Elements common to these alternatives are described below, followed by a section describing each alternative separately.

Elements Common to All Alternatives

All alternatives assume implementation of the interim remedy, including the following elements: a soil/bentonite slurry wall surrounding the oil contaminated portion of the site (see Figure 3), oil extraction and storage, groundwater monitoring, and treatment and discharge of enough groundwater to compensate for infiltration inside the wall.

All alternatives, with the exception of No Action, have the following elements in common:

- thermal destruction of the oil extracted and stored on-site under the first operable unit, either by on- or off-site incineration in compliance with RCRA and TSCA regulations,
- dismantling, decontaminating, and removing the oil storage tanks described in the interim remedy ROD,
- removal and disposal of contaminated sediments, discarded drums and other debris from on-site ponds, and trench spoils from slurry wall construction by placing materials under the

cap or soil cover. If materials are oil contaminated, they will be disposed of by thermal destruction in compliance with RCRA and TSCA regulations,

- placing deed and access restrictions on the site to ensure protection of the cap and soil cover and to prohibit use of groundwater under the site,

- monitoring air quality during excavation, handling, and treatment of waste, fill or soils and groundwater treatment. Corrective action will be implemented if air emissions exceed 1 x 10^{-6} cumulative carcinogenic risk or a hazard index of 1 at the site boundary.

- extraction and treatment of contaminated groundwater outside the slurry wall in areas exceeding MCLs and 10^{-5} cumulative carcinogenic risk, whichever is more stringent,

- continued use of the groundwater monitoring system required under the first operable unit and upgrade of the system, if necessary, to ensure that aquifer remediation goals are maintained outside the slurry wall, and

- continued groundwater treatment and discharge outside of the slurry wall to the extent necessary to compensate for infiltration. Treated water will be discharged by 1) reinjection to the shallow aquifer outside the slurry wall, 2) discharge to on-site surface water in accordance with NPDES standards, or 3) discharge in a deep injection well in accordance with EPA Underground Injection Control (UIC) regulations.

All alternatives including direct groundwater treatment have the following options: 1) no salt treatment, 2) treatment of all extracted groundwater for salt, and 3) treatment for salt only to the extent necessary to ensure that the salt migration is not exacerbated by the remedy.

Alternative 1: No Action

Under this alternative, no action would be taken other than implementation of the interim remedy. Recovered oil would remain stored on-site, and although contaminant migration in groundwater would be limited by the slurry wall, the potential for exposure to contaminated materials on-site would remain. Risks associated with this alternative are described in Section VI.

<u>Alternative 2: Containment With Oil Treatment and Optional Groundwater Treatment</u>

Alternative 2 involves source control through containment without treatment, except for treatment of the oil extracted under the first operable unit. Two options are included under this alternative: 2A includes groundwater extraction and treatment within the slurry wall only to the extent necessary to compensate for infiltration, while 2B includes extraction, treatment and reinjection of groundwater within the slurry wall. These options include the following elements, in addition to those described previously:

<u>Alternative 2A</u>

- Grading and capping the area within the slurry wall with a multilayer cap in compliance with RCRA Subtitle C regulations, and

- Continued use of the groundwater extraction and treatment system required under the first operable unit.

<u>Alternative 2B</u>

- Extraction, treatment and reinjection of contaminated groundwater within the slurry wall. The reinjection system would be designed to allow treated water to flow through contaminated soils and promote soil flushing. The goal of the groundwater treatment system would be to reduce contaminant levels to MCLs or 10^{-5} cumulative carcinogenic risk, whichever is more stringent, but the effectiveness of the remedy would be dependant on the ability of the flushing to remove source contaminants. It is not certain whether 10^{-5} cumulative carcinogenic risk could be achieved under this alternative.

- Grading and capping the area within the slurry wall with a multilayer cap in compliance with RCRA Subtitle C regulations.

It is estimated that the elements in Alternative 2 can be constructed in less than 2 years, but maintenance pumping and groundwater monitoring will continue indefinitely. The groundwater treatment and reinjection system under Alternative 2B would probably be in operation for more than 10 years.

Costs, as shown in Table 3, are dependant on the level of salt treatment in groundwater. Costs were developed for remediation of groundwater without salt treatment, and with salt treatment to 250 mg/l chloride (the secondary MCL).

<u>Alternative 3: Source Removal and Treatment With Groundwater Extraction and Treatment</u>

This alternative relies primarily on excavation and treatment of contaminant source materials by thermal destruction. Although the possibility of transport to an off-site incinerator has not been excluded, on-site incineration is considered a more likely option due to the large volume of waste and soil to be destroyed. Three volumes of waste and soil excavation were considered, as described below and as shown in Figure 9.

<u>Alternative 3A:</u> (Figure 9, Scenario A) involves removal of contaminated waste and fill within the boundaries of the containment barrier. Waste would be excavated until native soils are encountered. The maximum depth of excavation is estimated at 10 feet and the volume of materials to be excavated is estimated to be 70,000 cubic yards.

<u>Alternative 3B:</u> (Figure 9, Scenario B) involves removal of contaminated waste and fill material and oil contaminated native soils within the containment barrier. Based on test pits and boring logs, it is estimated that native soils have been contaminated by the oil layer to an elevation of approximately 590 feet (USGS datum). The maximum depth of excavation is estimated to be 12 feet. The total volume of materials to be excavated is estimated at 100,000 cubic yards.

<u>Alternative 3C:</u> (Figure 9, Scenario C) is a "hot spot" remediation scenario, involving removal of only the most highly contaminated waste and fill materials. Surface soils and oily fill materials within the estimated extent of the oil layer would be excavated until native soils are encountered. The maximum excavation depth is estimated at 10 feet and the volume of fill to be excavated is estimated at 36,000 cubic yards.

Alternative 3 includes the following elements, in addition to those described previously:

- Excavated materials would be incinerated in accordance with RCRA and TSCA regulations. This will most likely be done using a mobile incinerator on-site.

- Trench spoils, pond debris, and sediments showing high levels of oil contamination would also be incinerated.

- Residuals from on-site treatment processes, less contaminated sediments, pond debris and trench spoils from slurry wall construction would be disposed of in the excavated area.

- Grading and capping the area inside the slurry wall. The cap specifications will be dependant on the level of excavation chosen and the nature of process residuals. Scenarios A and B will not likely require a RCRA Subtitle C compliant cap unless

TABLE 3
SUMMARY OF ESTIMATED COSTS
OF ALTERNATIVES

	Capital Cost	Annual O&M	Present Net Worth
<u>Alternative 1</u>	$ 0	$ 0	$ 0
<u>Alternative 2</u>			
A. Limited groundwater treatment			
1. with no salt treatment	$ 5,720,000	$ 95,000	$ 6,529,000
2. with salt treatment	$ 5,807,000	$ 133,000	$ 6,931,000
B. With groundwater treatment			
1. with no salt treatment	$ 7,441,000	$ 439,000	$11,178,000
2. with salt treatment	$ 7,528,000	$1,258,000	$18,238,000
<u>Alternative 3</u>			
A. Excavate 70,000 cy			
1. with salt treatment	$28,943,000	$1,258,000	$39,653,000
2. with no salt treatment	$28,856,000	$ 439,000	$32,593,000
3. with limited salt treatment	$28,943,000	$ 489,000	$33,104,000
B. Excavate 100,000 cy			
1. with salt treatment	$38,558,000	$1,258,000	$49,268,000
2. with no salt treatment	$38,471,000	$ 439,000	$42,208,000
3. with limited salt treatment	$38,558,000	$ 489,000	$42,718,000
C. Excavate 36,000 cy			
1. with salt treatment	$18,048,000	$1,258,000	$28,758,000
2. with no salt treatment	$17,961,000	$ 439,000	$21,698,000
3. with limited salt treatment	$18,048,000	$ 489,000	$22,209,000
<u>Alternative 4</u>			
A. Excavate 70,000 cy			
1. with no salt treatment	$27,151,000	$ 232,000	$29,126,000
2. with limited salt treatment	$27,238,000	$ 270,000	$29,537,000
3. with limited groundwater treatment	$27,137,000	$ 95,000	$27,946,000
B. Excavate 100,000 cy			
1. with no salt treatment	$36,765,000	$ 232,000	$38,740,000
2. with limited salt treatment	$36,852,000	$ 270,000	$39,151,000
3. with limited groundwater treatment	$36,750,000	$ 95,000	$37,559,000
C. Excavate 36,000 cy			
1. with no salt treatment	$16,257,000	$ 232,000	$18,232,000
2. with limited salt treatment	$16,344,000	$ 270,000	$18,643,000
3. with limited groundwater treatment	$16,241,000	$ 95,000	$17,050,000

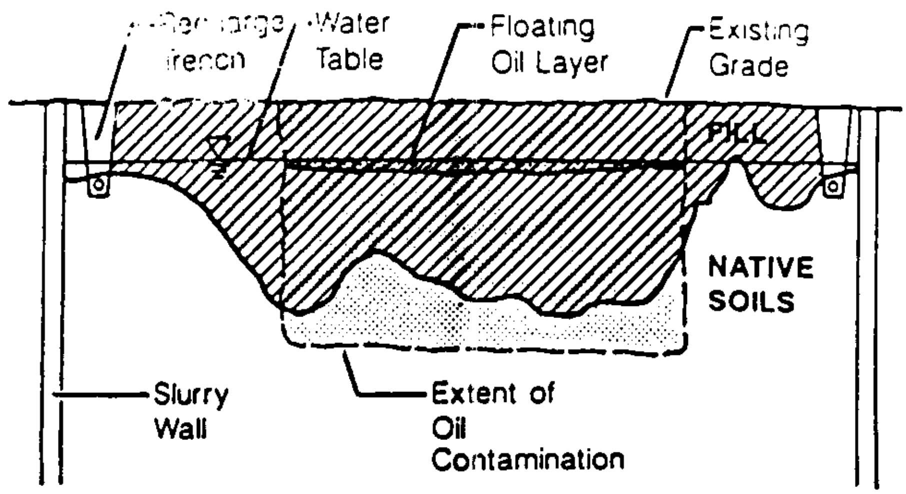
TABLE 3 (Con't)
SUMMARY OF ESTIMATED COSTS
OF ALTERNATIVES

	Capital Cost	Annual O&M	Present Net Worth
<u>Alternative 5</u>			
1. with salt treatment	$71,891,000	$1,236,000	$82,644,000
2. with no salt treatment	$71,804,000	$ 439,000	$75,541,000
3. with limited salt treatment	$71,891,000	$ 489,000	$76,052,000
<u>Alternative 6</u>			
1. with no salt treatment	$70,099,000	$ 232,000	$72,024,000
2. with limited salt treatment	$70,186,000	$ 270,000	$72,485,000

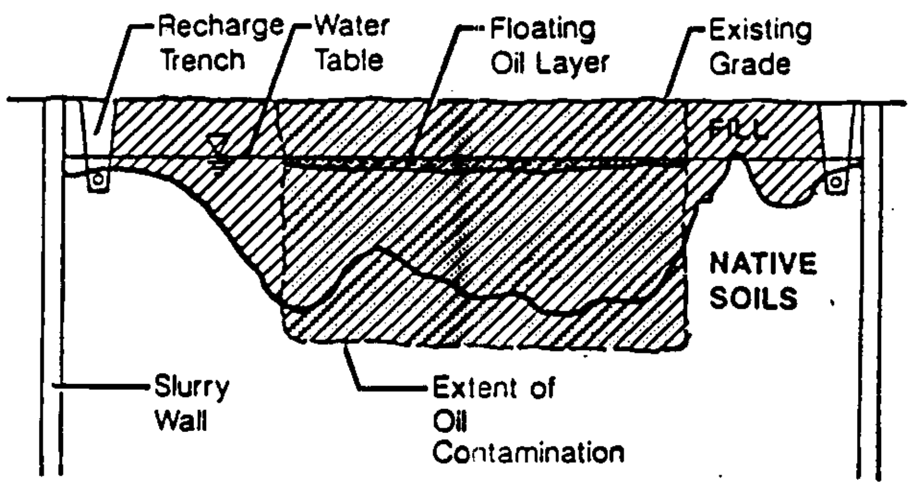
"Salt treatment" - cost estimates include treatment of all groundwater for salt by reverse osmosis to 250 mg/l chloride.

"Limited salt treatment" - cost estimates include treatment of groundwater to be discharged inside the slurry wall by reverse osmosis to 250 mg/l chloride.

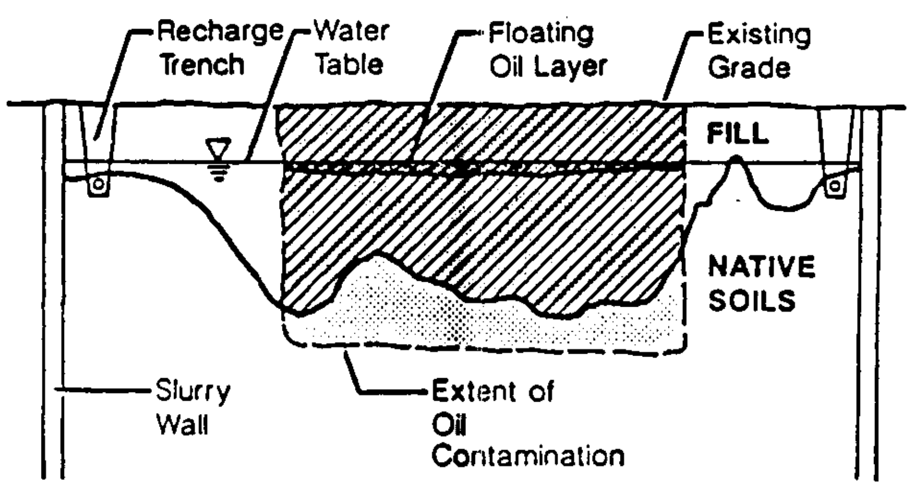
"Limited groundwater treatment" - cost estimates include continued use of the groundwater treatment system required under the first operable unit ROD only.



Scenario A - CROSS HATCHED AREA TO BE EXCAVATED



Scenario B - CROSS HATCHED AREA TO BE EXCAVATED



Scenario C - CROSS HATCHED AREA TO BE EXCAVATED

WARZYN

Excavation Scenario Schematics

Feasibility Study
Ninth Avenue Dump
Gary, Indiana

DWN LGL | APP'D MSR | DATE 1/26/89 | 13436 | A8 process residuals are determined to be RCRA hazardous. Since Scenario C addresses only the most contaminated materials, a RCRA Subtitle C compliant multilayer cap would be required for this option.

- Extraction and on-site treatment of groundwater inside the slurry wall. Treated groundwater would be reinjected to the area inside the slurry wall to promote flushing of remaining contaminants from soils. Some treated water would be discharged outside the slurry wall to compensate for infiltration, as described previously. The aquifer remediation goal is MCLs or 10^{-5} cumulative carcinogenic risk, whichever is more stringent.

Construction of on-site treatment facilities, excavation and incineration of soil may take up to 5 years. Groundwater treatment will likely continue for more than 10 years and maintenance pumping and groundwater monitoring will continue indefinitely.

Alternative 3 costs are given in Table 3. Costs are dependant on the level of soil excavation and the level of salt treatment.

Alternative 4: Source Removal With In-situ Groundwater Treatment

The waste and soil components of Alternative 4 are the same as those in Alternative 3. This alternative includes the same three levels of soil excavation as Alternative 3. However, in this alternative, groundwater will be treated in-situ inside the slurry wall by bioreclamation or chemical oxidation. A limited amount of groundwater would be extracted, treated and discharged outside the slurry wall to compensate for infiltration, as described previously.

Because in-situ groundwater treatment methods would not likely be as effective for some of the contaminants at Ninth Avenue Dump, such as vinyl chloride and heptachlor epoxide, it is estimated in the FS that this remedy is not likely to achieve a less than 10^{-3} cumulative carcinogenic risk level in groundwater.

Time for implementation of the waste and soil components of Alternative 4 are the same as those for Alternative 3. Groundwater treatment to achieve a 10^{-3} carcinogenic risk level will take greater than 20 years. Groundwater monitoring and maintenance pumping will continue indefinitely.

Costs for Alternative 4 are presented in Table 3.

Alternative 5: In-situ Source Treatment With Groundwater Extraction and Treatment

Under this alternative, contaminated waste, fill and soils would be treated by in-situ vitrification (ISV) to a depth of approximately 12 feet. Groundwater would be extracted and treated by the method presented in Alternative 3.

In the ISV process, large electrodes are placed in boreholes around the area to be treated. A hood is placed over the area to collect off-gasses. An electric current is applied, causing the soil to melt. Organic contaminants and metals are thermally decomposed, volatilized, or immobilized in the vitrified material. The final result is an obsidian like mass.

Components of this alternative, other than those described previously are as follows:

- treatment of all contaminated waste and native soils by in-situ vitrification, to a depth of approximately 12 feet,
- covering the vitrified area with a soil cover, and
- groundwater extraction and treatment by the method described in Alternative 3.

The source control components of this alternative will take approximately 5 years to complete, while groundwater treatment will require in excess of 10 years. Groundwater monitoring will continue indefinitely.

Costs for Alternative 5 are presented in Table 3.

Alternative 6: In-situ Source Treatment With In-situ Groundwater Treatment

The source control components of Alternative 6 are the same as Alternative 5, while the groundwater treatment components are the same as those in Alternative 4. Contaminated waste, soil and debris would be treated to a depth of approximately 12 feet by ISV, and then covered with a soil cover. Groundwater would be treated in-situ by bioreclamation or chemical oxidation.

The source control components will take approximately 5 years to complete, while groundwater treatment will take in excess of 10 years to meet a 10^{-3} carcinogenic risk level.

Costs for Alternative 6 are presented in Table 3.

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS

The nine criteria used by EPA to evaluate remedial alternatives include: overall protection of human health and the environment; compliance with applicable, or relevant and appropriate, requirements (ARARs); long-term effectiveness; reduction of toxicity, mobility, or volume; short-term effectiveness; implementability; cost; state acceptance; and community acceptance. Based on evaluation of the alternatives with respect to the nine criteria, EPA has selected Alternative 3C - "Hot Spot" remediation of oil contaminated waste and soils, with groundwater extraction and treatment - as the preferred alternative for the Ninth Avenue Dump final remedy.

Protection of Human Health and the Environment

Alternatives 3 and 5 achieve protection of human health and the environment by addressing the three primary sources of risk: contaminated soils and buried wastes, contaminated groundwater, and the oil collected in the first phase and stored on-site. Alternative 1 provides no further current or future protection over that provided by the interim remedy, as described in Section VI. Alternative 2 limits exposure by capping and institutional controls, and is protective as long as the remedy is maintained. Alternatives 4 and 6 provide similar protection to Alternatives 3 and 5, however, these alternatives offer slightly lower overall protection due to the limitations of in-situ groundwater treatment technologies.

Compliance With Applicable, or Relevant and Appropriate, Requirements

Applicable, or relevant and appropriate, requirements (ARARs) and "to be considered" (TBC) criteria for the alternatives under consideration at this site are described in Table 4.

All alternatives, with the exception of "No Action", would comply with ARARs. Alternatives 2 through 6 require that all site-related groundwater contamination at levels exceeding MCLs be contained by the slurry wall, or treated. Alternatives 2, 3C and 4C would not meet cleanup goals set under the TSCA PCB spill cleanup policy, a "to be considered" criterion. ARARs for the final remedy are more fully discussed in Section XI.

Long-Term Effectiveness and Permanence

Alternatives 3 and 5 provide the most effective long-term solution to site problems. The long-term effectiveness of Alternatives 4 and 6 are similar to that of 3 and 5, except that in-situ groundwater treatment would not be as effective as the treatment system proposed for Alternatives 4 and 6. The effectiveness of the soil excavation options provided in Alternatives 3 and 4 are proportional to the amount of soil and waste to be remediated. Alternative 2 is equivalent in effectiveness to the other alternatives in the short-term, however, if access restrictions fail and the containment barriers are not maintained, residual risks on-site would eventually be similar to that of the No Action Alternative, except that oil would be incinerated.

Reduction of Toxicity, Mobility, or Volume

Alternatives 3 and 5 provide the best levels of reduction of toxicity, mobility, and volume (TMV) of contaminants in oil, soils, waste and

TABLE 4

Probable ARARs or TBCs
Ninth Avenue Dump

Probable ARAR (or TBC)	Purpose	Requirements
	CHEMICAL-SPECIFIC ARARs	
Safe Drinking Water Act (SDWA)		
Groundwater MCLs	Protection of public drinking water supplies.	Public water systems supplying at least 25 individuals must meet MCLs.
Maximum contaminant level goals	Protection of public drinking water supplies.	Sets nonenforceable health goals for public water supplies.
Resource Conservation and Recovery Act (RCRA)		
40 CFR Part 264 Subpart F: Releases from solid waste management units	Sets groundwater protection standards for releases from RCRA regulated facilities.	Groundwater must meet RCRA MCLs at the downgradient edge of the waste management unit. Alternate concentration limits (ACLs) can be set under limited circumstances.
Clean Water Act (CWA)		
40 CFR Part 122, 125, National Pollutant Discharge Elimination System (NPDES)	Protection of surface water from discharge of pollutants.	Requires States to establish permit programs for discharge of pollutants to surface water.
Ambient Water Quality Criteria (AWQC)	National criteria for protection of surface water.	AWQC are national guidelines intended to assist States in setting surface water quality protection standards.
Indiana Water Quality Standards		
330 IAC 1-1-6 Water Quality Standards	Protection of State surface waters	Sets descriptive water quality standards.
327 IAC 2-1-6 Proposed Water Quality Standards	Protection of State surface waters	Proposed quantitative water qualtiy standards for surface waters of the State.
330 IAC 1-1-7 Standards for Underground Waters	Protection of State underground waters	Requires underground waters to meet minimum water quality conditions for potable or industrial use.

TABLE 4 (p 2 of 4)

Probable ARARs or TBCs
Ninth Avenue Dump

Probable ARAR (or TBC)	Purpose	Requirements
	LOCATION-SPECIFIC ARARs	
Executive Order 1190: Protection of Wetlands	Avoid short- and long-term adverse effects caused by Federal actions in wetland areas.	Agencies are required to avoid engaging in or assisting with new construction in a wetland area unless there is no practicable alternative and every attempt is made to mitigate adverse impacts.
Fish and Wildlife Coordination Act	Protection of fish and wildlife when Federal actions result in the control or structural modification of a natural body of water	Federal agencies must take into consideration the effect water related projects would have on fish and wildlife. Coordination with USFWS is required.
Clean Water Act (CWA)		
40 CFR Part 230: Guidelines for disposal of dredged or fill material	Establishes guidelines for review of permits for discharge of dredged or fill material into aquatic environments.	Prohibits discharge of dredged or fill material where there is a practicable alternative and requires minimization of impact to aquatic ecosystems. May require mitigation of unavoidable filling.
	ACTION-SPECIFIC ARARs	
Resource Conservation Recovery Act (RCRA)		
40 CFR Part 261: Identification and listing of hazardous waste	Defines wastes subject to regulation under RCRA	Wastes are subject to regulation under RCRA if: 1) Wastes are ignitable, corrosive, reactive or EP toxic; 2) Wastes are listed as hazardous; 3) Wastes as mixtures listed as hazardous.
40 CFR Part 262: Standards for generators of hazardous waste	Establishes standards for generators of hazardous waste	Requires identification of waste generation activity, obtaining an EPA ID number, manifesting and record keeping.
40 CFR Part 263: Standards for transporters of hazardous waste	Establishes standards for transporters of hazardous waste.	Transport of hazardous waste is subject to DOT regulations, as well as manifesting, record keeping and discharge cleanup requirements.
40 CFR Part 264: Standards for owners and operators of hazardous waste treatment, storage and disposal facilities.	Establishes standards for the acceptable management of hazardous waste.	

Probable ARARs or TBCs
Ninth Avenue Dump

Probable ARAR (or TBC)	Purpose	Requirements
Subpart J: Tanks	Establishes standards for tanks used to treat or store hazardous waste.	Requirements for design, operation, inspection, and closure of tanks.
Subpart O: Incinerators	Establishes standards for incineration of hazardous waste	Requires destruction and removal efficiency (DRE) of 99.99% for each principal organic hazardous constituent and 99.9999% DRE for PCBs.
Land Ban		
40 CFR Part 268: Land Disposal restrictions	Identifies hazardous wastes prohibited from land disposal.	Prohibits land disposal and establishes treatment standards for hazardous waste, including solvents and dioxins. Dioxins at extract concentrations > 1 ppb must be treated by incineration or equivalent technology. Time frame established for land disposal restrictions.
Toxic Substances Control Act (TSCA)		
40 CFR Part 761: PCB use prohibitions	Establishes prohibitions and requirements for the use, disposal, storage, labeling and recordkeeping of PCB-contaminated materials.	
Subpart D: Storage and disposal	Establishes requirements for storage and disposal of materials containing PCBs based on concentration.	Storage: Provides structural requirements, SPCC plan, and inspection requirements for storage of items containing 50 ppm or greater PCBs. Disposal: Liquids containing PCBs at concentrations > 500 ppm must be incinerated. Liquids and solids containing PCBs at concentrations > 50 ppm must either be landfilled, incinerated or destroyed in a high-efficiency boiler. Provides performance requirements.
Subpart G: PCB spill cleanup policy	Establishes cleanup action levels for PCB spills based on amount spilled and location of spill.	Requires cleanup of spills of materials containing greater than 50 ppm PCBs. Specifies clean up levels based on location of spill.
Safe Drinking Water Act (SWDA)		
40 CFR Part 144: Underground injection control program	Establishes minimum requirements for underground injection of waste.	Requirements based on classification of well. Wells injecting treated contaminated water into the aquifer from which it was drawn are Class IV. These are prohibited except for CERCLA or RCRA cleanups.
Clean Air Act (CAA)		
40 CFR 50: National ambient air quality standards	Sets national primary and secondary air standards to protect public health and the environment.	Construction plans of new sources of air pollutants must be reviewed by State to determine whether best available control technology will be required.

TABLE 4 (p 4 of 4)

Probable ARARs or TBCs
Ninth Avenue Dump

Probable ARAR (or TBC)	Purpose	Requirements
Section 111 of CAA: New source performance standards	Insures new stationary sources will reduce emissions to a minimum.	Promulgates standards for classes of stationary sources including incinerators.
Section 112 of CAA: National Emissions Standards for Hazardous Air Pollutants	Establishes emissions standards for hazardous air pollutants.	Emissions standards established by source. No standards for incinerators.
Occupational Safety and Health Act (OSHA)		
29 CFR 1910: Regulations for workers involved in hazardous Materials	Ensures safety of workers at hazardous waste operations.	Regulates training, protective equipment, proper handling of waste, personnel monitoring, and emergency procedures for hazardous waste workers.
Hazardous Materials Transportation Act		
49 CFR 100-199: Transportation of Hazardous Materials	Ensures safe transportation of hazardous materials.	Requirements for labelling, packaging, shipping, manifesting, and transport of hazardous materials.
State ARARs		
325 IAC 6-4: Fugitive dust	Protect against fugitive dust emissions during construction	Requires every available precaution be taken during construction to minimize fugitive dust emissions.
325 IAC 8-1.1-2 325 IAC 8-1.1-6 VOC Emissions	Regulates VOC emissions.	Requires new sources to reduce VOC emissions using Best Available Control Technology, if emissions are ≥ 25 tons/year.
330 IAC 5-2-2	Regulates treatment facility effluent.	An NPDES permit must be obtained for discharge to a surface water body.
320 IAC 4.1-54	Regulates incinerator operation.	Must obtain thermal destruction efficiencies of contaminants in excess of 99.99% for principal organic hazardous constituents (POHC).
320.IAC 4.1-53-6(a)	Provides standards for construction of hazardous landfill cap.	Final cover must be designed to provide long-term integrity with minimal maintenance.

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groundwater. Alternative 1 provides no reduction in TMV. Alternative 2 would reduce TMV for the oil, but provides only a limited reduction in mobility in other media through containment. Alternatives 4 and 6 are similar to Alternatives 3 and 5, except that there would be less reduction in TMV of contaminants in groundwater, since the in-situ groundwater treatment technology would not likely be as effective as direct treatment.

Short-Term Effectiveness

All action alternatives are more effective in reducing risks to the local community and the environment than the No Action Alternative. Alternatives 2 through 6 will require personal protection and other safety measures to reduce risks to on-site workers during construction. All of these alternatives will utilize air monitoring during excavation and control of process emissions to ensure protection of the neighboring community. Construction and soil treatment can be completed in approximately 5 years or less for all alternatives. Alternative 2 can be constructed the most quickly, in 2 years or less.

Implementability

Alternatives 2, 3 and 4 utilize conventional technologies and readily available materials and services. Alternatives 5 and 6 use a process which is not as conventional (in-situ vitrification) but its use at the site appears technically feasible.

Cost

Costs are detailed in Table 3. Although Alternatives 5 and 6 are similar in protection and effectiveness to Alternatives 3 and 4, Alternatives 5 and 6 are considerably more expensive. In Alternatives 3 and 4, the level of soil excavation is proportional to the cost. Alternative 3C, which calls for excavation only of oil contaminated fill and debris, is considered by EPA to be the most cost-effective alternative because it is the least costly alternative that effectively mitigates threats to and provides adequate protection of public health, welfare and the environment.

State Acceptance

The Indiana Department of Environmental Management (IDEM) has been involved throughout the RI/FS and is expected to concur with Alternative 3C as the selected remedy.

Community Acceptance

Community involvement at the site has been moderate, however, several community leaders have expressed opposition in public meetings and public comments to on-site incineration due to concern about air emissions. A complete list of public comments and responses to those comments are provided in Appendix B.

IX. DOCUMENTATION OF SIGNIFICANT CHANGES

During negotiations for performance of the final remedy, PRPs proposed the use of low temperature thermal stripping rather than incineration to treat excavated fill materials. This process heats waste to a lower temperature than incineration, typically 500 - 800° F, and volatilizes organic contaminants. The contaminants contained in the off-gasses are condensed and can be sent to an off-site incinerator for treatment. This process could be used for some of the fill to be treated, but some materials such as wood, drums and the tracted oil would still have to be incinerated.

In order to accommodate this request, the treatment process specified for the selected remedy has been changed to "thermal treatment", rather than "incineration". Low temperature thermal stripping may be pilot tested during the design phase, but will be allowed only if: 1) it proves to be more cost-effective than incineration; 2) a mobile unit or sufficient off-site capacity is available; 3) emissions meet the standards specified in Section X; and 4) residuals contain less than 2 mg/kg PCBs (the TSCA requirement to show a technology will provide equivalent PCB destruction to incineration) and residuals pass RCRA Toxic Characteristic Leach Procedure (TCLP) extract requirements.

This change has also been made in order to accommodate concerns expressed by the local community about emissions from an on-site incinerator. Although EPA does not believe that emissions from an on-site incinerator will create a public health risk, the Agency is willing to pilot test a technology that might be more acceptable to residents by eliminating the need for on-site incineration, or by reducing the amount of material to be incinerated on-site.

X. SELECTED REMEDY

As discussed in the previous section, EPA has selected Alternative 3C - "Hot spot" remediation of oil contaminated waste and fill materials, with groundwater extraction and treatment - as the most appropriate final remedy for the Ninth Avenue Dump site. This alternative was selected because it is the most cost-effective remedy providing for protection of human health and the environment and long term effectiveness. The components of the selected remedy are described below, and a schematic diagram is shown in Figure 10.

Waste, soils, and oil

Oil contaminated waste and fill materials will be excavated from the area inside the slurry wall, down to but not including the native sand. The intent of the excavation is not to clean the area to health based levels, but rather to remove the most highly contaminated fill materials and enhance and ensure the long term effectiveness of the containment and groundwater treatment components of the remedy. The extent of excavation

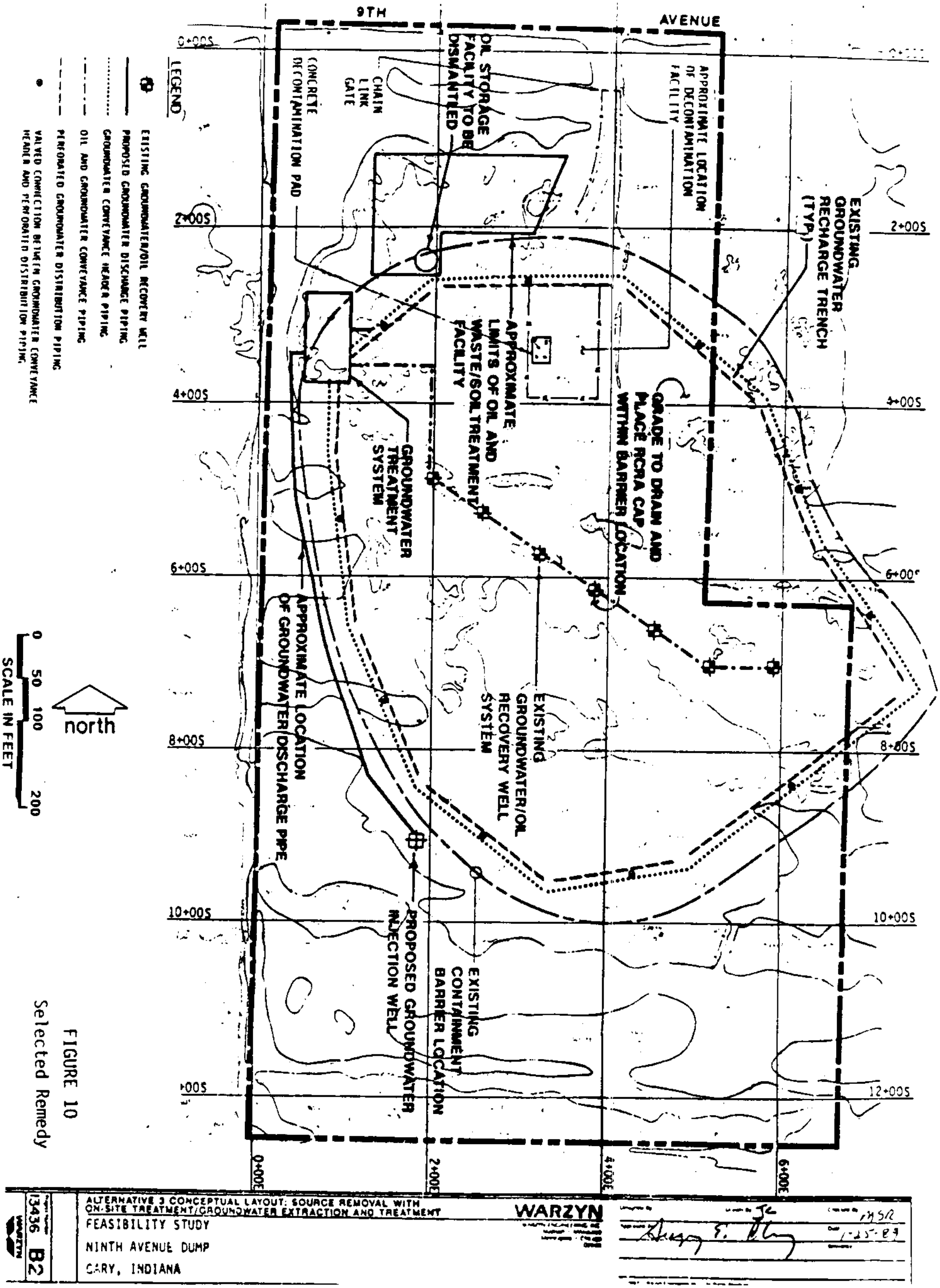

FIGURE 10
Selected Remedy

TABLE 5

TARGET CLEANUP LEVELS FOR INDICATOR CONTAMINANTS IN GROUNDWATER (ug/1)

Chemical	Risk based(1)	MCL	MCLG	PQL(2)
heptachlor	0.022	-	-	0.05
PAH	0.005	-	-	10(3)
bis(2-ethylhexyl)phthalate	85	-	-	10
benzene	.07	5	0	2
trichloroethylene	3.5	5	0	1
vinyl chloride	0.021	2	0	2
lead	110	50	20	10
toluene	7,550	-	2,000(4)	2

(1) Based on 1×10^{-5} cumulative carcinogenic risk, or hazard index of 1.

(2) Source: 52 FR 2597. Practical quantitation limits for standard analytical methods.

(3) For benzo(a)pyrene.

(4) Proposed MCLG.

will be based on factors other than health based cleanup levels, as explained below.

The limits of excavation will be established by the historical horizontal and vertical extent of the oil layer and depth to native soils as determined by soil borings and/or test excavations in the design phase, and by observations during the remedial action. An objective method for distinguishing "oil contaminated" from "non-oil contaminated" materials will be proposed by the remedial design consulting firm and evaluated by EPA.

The slurry wall (currently in the design phase) will be placed a sufficient distance from the anticipated excavation area to ensure that excavation of fill will not damage the integrity of the slurry wall.

Excavated waste and fill, oil extracted under the first operable unit, and pond sediments and trench spoils showing high levels of contamination will be treated through thermal treatment, most likely through on-site incineration with a mobile incinerator meeting TSCA and RCRA requirements. Although off-site incineration has not been precluded, it is anticipated that on-site incineration will be less costly than transporting materials off-site for incineration. In addition, another thermal treatment process may be pilot tested, as described in Section IX.

It may be determined in design for the first operable unit that it is more cost-effective to transport oil off-site for incineration than to build and maintain a TSCA compliant oil storage facility on-site. In this case, only waste and fill would be treated on-site.

Incineration and groundwater treatment process residuals will be landfilled in the excavated area, along with relatively uncontaminated trench spoils from slurry wall construction, pond sediments and debris from ponds. The excavated area will be filled to grade with clean fill and the entire area encompassed by the slurry wall will be covered with a multilayer cap meeting RCRA Subtitle C requirements. The cap will be installed prior to full scale implementation of the groundwater extraction and treatment portion of the remedy to reduce the volume of water to be treated.

It is anticipated that thermal treatment will take approximately five years to complete.

Groundwater:

Groundwater within the slurry wall will be extracted, treated and reinjected inside the containment area to flush remaining water soluble contaminants from soils. Bench scale testing to determine the feasibility of various treatment processes is currently underway. Some processes under consideration for groundwater treatment include chemical coagulation/ precipitation, air stripping, activated sludge with optional powdered activated carbon addition, granular activated carbon, strong acid/strong base ion exchange, and membrane separation.

The target cleanup levels (TCLs) for groundwater are: MCLs or 1×10^{-5} cumulative carcinogenic risk, whichever is more stringent, for carcinogens, and MCLs, MCLGs, or a hazard index of 1, whichever is more stringent, for noncarcinogens. If only one constituent is detected in groundwater at a 1×10^{-5} (or greater) carcinogenic risk level, the MCL for that contaminant may be used rather than the risk-based TCL. Example target cleanup levels (TCLs), MCLs, and detection limits for indicator contaminants are given in Table 5, however, TCLs should be recalculated in the RD/RA phase to reflect the contaminants least amenable to treatment, new health effects information, and the best analytical detection limits at that time.

The point of compliance will be monitoring wells at the downgradient (outside) edge of the slurry wall and RCRA cap. TCLs will also be used as the treatment goal for groundwater to be reinjected inside the slurry wall, to ensure TCLs will be met at the point of compliance even in the event of a complete slurry wall failure. Since the point of reinjection will be approximately 20 to 30 feet from the point of compliance, there will be little to no natural attenuation between these two points if the slurry wall fails.

Because the great majority of the total dissolved solids (TDS) at the site is from an upgradient source, no treatment level will be set for salt cleanup inside the slurry wall or at the point of compliance. The intent of this remedy is not to clean up salt, but rather to ensure that the groundwater treatment remedy does not make the situation worse by spreading the salt plume.

The TCLs described above also apply to groundwater outside the slurry wall, with the following exceptions: some monitoring wells along Ninth Avenue and the Cline Avenue frontage road (X52, X48, X49, X50, X51, see Figure 4) are excluded because they showed low levels of organic contamination which do not appear to be attributable to the site. There have been numerous reports by the public and observations by site workers of trash dumping and discharge of liquid waste in the ditches along these roads and of waste disposal on the adjacent Ninth and Cline site. The types of contaminants found in these wells are somewhat different than those on-site and groundwater flow patterns indicate that site contaminants are unlikely to have migrated to these areas, especially to X52 and X50/51. Thus, EPA does not believe it would be appropriate to consider these wells in defining the extent of site related groundwater contamination.
An attempt will be made in design to site the slurry wall such that groundwater outside the wall meets TCLs, with the exceptions described above. If this is not possible, a limited amount of groundwater will be extracted and treated outside the slurry wall to meet these standards.

A small amount of treated groundwater will be discharged outside the slurry wall to compensate for infiltration. The cleanup level will be determined by the discharge option:

1) Treatment to TCLs and reinjection to the shallow aquifer outside the slurry wall. Salt would be treated only to the extent necessary to ensure that the existing salt plume is not made worse by groundwater remediation.

2) Discharge to on-site surface water in accordance with NPDES standards.

3) Discharge in a deep injection well in accordance with UIC regulations. The required level of treatment would be determined by the UIC program.

The aquifer remediation goal of 1×10^{-5} cumulative carcinogenic risk contradicts and supercedes the 1×10^{-6} cumulative carcinogenic risk level set by the first operable unit ROD. The 10^{-5} risk level is considered more appropriate for this site because of the multiple sources of contamination in the Calumet Aquifer and because institutional controls will prohibit use of groundwater under the site. Also use of a 10^{-6} risk level will result in cleanup levels for individual contaminants far below analytical detection limits (see Table 5).

It is estimated that the pump and treat system will be in operation for 10 to 15 years to meet the target cleanup levels.

Surface Water/Sediments

Surface water will not be treated directly, but eliminating migration of contaminants from source areas through treatment and containment will result in a reduction of contaminant concentrations over time. Sediments exceeding target cleanup levels will be dredged and added to the fill materials under the RCRA cap, unless oil concentrations are high enough to warrant incineration. As described for fill materials, an objective method for determining "oil contamination" will be developed during the design phase. Based on a comparison of sediment analytical data to human health criteria and background soil samples, the best indicator of sediment contamination appears to be PAHs. Further sediment sampling will be done in the area of SD2, SD11, SD13, and SD19 (see Figure 8 - other areas exceeding criteria will be covered by the RCRA cap). Sediments will be excavated if total PAHs exceed 2400 ug/kg (95% upper confidence level for PAHs in soil background samples). Discarded drums and other debris will be removed from on-site ponds and used as fill under the cap.

Other

Other components of the selected remedy include:

- Dismantling, decontaminating and removing from the site the oil storage facility constructed under the first operable unit.

- Instituting deed and access restrictions to protect the RCRA cap and prohibit use of the groundwater under the site.

- Continued groundwater monitoring using the monitoring system designed under the first operable unit, and upgrade of the system if necessary.

- Air monitoring during excavation, handling, and treatment of waste and fill materials and groundwater treatment and corrective action if emissions exceed 1×10^{-6} cumulative carcinogenic risk or a hazard index of 1 at the site boundary.

- Continued maintenance of the fence around the site and the use of other security measures to protect on-site structures from vandalism.

Long term operation and maintenance will include operation and maintenance of the groundwater pump and treat system for an estimated 10 to 15 years, continued site security measures, and long term groundwater monitoring.

The cost of the selected remedy is listed below:

Capital Cost:	$18,048,000
Annual Operation and Maintenance:	$ 489,000
Total Present Net Worth:	$22,209,000

XI. STATUTORY DETERMINATIONS

EPA and IDEM believe the selected remedy satisfies the statutory requirements specified in Section 121 of SARA to protect human health and the environment; attain ARARs; utilize permanent solutions and alternate treatment technologies to the maximum extent practicable.

Protection of Human Health and the Environment

The selected remedy provides protection of human health and the environment through a combination of treatment and containment. Risks due to exposure to contaminated soils will be reduced through: 1) excavation and thermal treatment of the most highly contaminated fill materials, 2) soil flushing to reduce the remaining contamination, and 3) containment with a soil/bentonite slurry wall and RCRA cap. Risks from exposure to groundwater will be reduced through the pump and treat system and deed restrictions prohibiting use of groundwater on-site. Risks from the oil stored on-site under the first operable unit will be eliminated through incineration of the oil and decontamination and removal of the on-site oil storage facility.

Short term impacts to off-site residents during construction are expected to be minimal. Air monitoring will be used during all phases of construction where emissions might occur, especially during excavation of contaminated soils, and corrective actions will be taken if air emissions exceed health-based levels. Although some impact to wetlands areas is expected during construction of the first operable unit, final remedy construction should not result in further impact to wetlands.

Attainment of Applicable, or Relevant and Appropriate, Requirements

This action meets Federal and more stringent State ARARs. ARARs and TBCs considered for all alternatives are listed on Table 4, and ARARs specific to the selected remedy are described in Table 6.

Cost-Effectiveness

Alternative 3C was selected because it is the most cost-effective alternative providing for protection of human health and the environment and long term effectiveness. Alternative 2 provides a less expensive containment alternative which is protective in the short term but relies on a slurry wall which would require maintenance and possibly replacement in the future to ensure its effectiveness. Several more expensive alternatives were considered, from removal of all contaminated fill materials at $33 million to in-situ vitrification with full salt treatment of groundwater at $83 million. Since the selected remedy addresses the most highly contaminated portion of the site, the higher cost remedies provide only a small incremental increase in effectiveness.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected alternative provides the best balance of protectiveness, permanence, and cost, along with the other evaluation criteria used for remedy selection. It will be more effective in the long term than the containment alternative, as described in the previous section. Since the oil layer contains higher concentrations of contaminants than any other medium, removal of oil contaminated fill materials should eliminate the largest source of contamination at the site. Native soils were not included because contaminants can be more easily flushed from sand than from the heterogeneous fill materials.

All alternatives evaluated in the FS, except for No Action, provide essentially equal short term protectiveness through containment or treatment. Alternative 3C was chosen because it provides a level of treatment sufficient to reduce the threat of migration of contaminants to groundwater, even if the containment portion of the remedy eventually fails.

Preference for Treatment as a Principal Element

The selected remedy utilizes treatment to address the principal threats at the site through incineration of highly contaminated oil and oily fill materials and flushing to reduce concentrations of water soluble contaminants in the areas not addressed by incineration.

TABLE 6
ARARS (AND TBC CRITERIA) FOR THE SELECTED REMEDY

Regulation	Discussion
	Chemical Specific ARARs
Safe Drinking Water Act (SDWA)	MCLs set under the SDWA are relevant and appropriate. MCLGs are "to be considered" (TBC). MCL, MCLGs or target cleanup levels, whichever is more stringent, will be met for non-carcinogens. For carcinogens, MCLs or target clean up levels, whichever is more stringent, will be met.
40 CFR Part 264, Subpart F	RCRA groundwater protection and monitoring standards are relevant and appropriate.
40 CFR Part 122, 125	NPDES standards will be relevant and appropriate if treated groundwater is discharged to on-site surface water bodies.
Clean Water Act (CWA)	AWQC set under the CWA are relevant and appropriate for surface water bodies. AWQC will be met through source control, rather than active restoration.
330 IAC 1-1-6, 1-1-7, 2-1-6	Promulgated Indiana water quality standards are relevant and appropriate. Indiana proposed water quality standards are TBC.
	Location Specific ARARs
Executive Order 11990, Fish and Wildlife Coordination Act, CWA Section 404	Requirements for protection of wetlands are relevant and appropriate. Precautions will be taken to minimize impacts to wetlands during remedial action.
	Action Specific ARARs
40 CFR Part 264, Subpart J	RCRA storage tank closure requirements will be relevant and appropriate for removal of oil storage tanks.
40 CFR Part 264, Subpart N	RCRA landfill closure requirements

TABLE 6 (con't)

	will be relevant and appropriate for the multilayer cap.
40 CFR Part 264, Subpart O	RCRA incineration requirements will be relevant and appropriate for on-site incineration.
40 CFR Part 268	RCRA land disposal restrictions (LDR) may be relevant and appropriate requirements for ash disposal if material to be landfilled on-site is RCRA characteristic due to EP Toxicity.
40 CFR Part 761, Subpart D	TSCA incineration requirements will be relevant and appropriate for incineration of PCB contaminated oil and waste.
40 CFR Part 761, Subpart G	TSCA PCB spill cleanup policy is a TBC. Requirements to clean spills of greater than 50 ppm PCBs may not be met in all areas. Instead, protection from PCB contaminated materials will be provided through a combination of treatment and containment.
40 CFR Part 144	Underground Injection Control (UIC) requirements are relevant and appropriate for shallow or deep well injection of groundwater.
29 CFR 1910	OSHA safety standards are applicable to workers on-site.
325 IAC 6-4	Indiana fugitive dust emissions standards are relevant and appropriate.
330 IAC 5-2-2	Indiana surface water discharge requirements are relevant and appropriate if treated groundwater is discharged to surface water.
320 IAC 4.1-54	Indiana requirements for incinerator operation are relevant and appropriate.
320 IAC 4.1-53 6(2)	Indiana cap requirements for hazardous waste landfills are relevant and appropriate for the multilayer cap.

LIST OF APPENDICES

APPENDIX A
ANALYTICAL DATA

TABLE 1-1
SURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
VOLATILES					
Chloromethane	74-87-3	ND	ND	----	----
Bromomethane	74-83-9	ND	ND	----	----
Vinyl Chloride	75-01-4	ND	ND	----	----
Chloroethane	75-00-3	ND	ND	----	----
Methylene Chloride	75-09-2	5	190,000	86	34
Acetone	67-64-1	13	94,000	1,160	125
Carbon Disulfide	75-15-0	ND	ND	---	----
1,1-Dichloroethene	75-35-4	ND	ND	----	----
1,1-Dichloroethane	75-35-3	4.2	4.2	4.2	1.1
trans-1,2-Dichloroethene	156-60-5	ND	ND	----	----
Chloroform		2.4	2.4	2.4	1.0
1,2-Dichloroethane	107-06-2	ND	ND	----	----
2-Butanone	78-93-3	290,000	930,000	519,326	4.0
1,1,1-Trichloroethane	71-55-6	3	210,000	423	6.8
Carbon Tetrachloride	56-23-5	ND	ND	----	----
Vinyl Acetate	108-05-4	ND	ND	----	----
Bromodichloromethane	75-27-4	ND	ND	----	----
1,2-Dichloropropane	78-87-5	ND	ND	----	----
trans-1,3-Dichlropropene	10061-02-6	ND	ND	----	----
Trichloroethene	79-01-6	2	23,000	28	2.4
Dibromochloromethane	124-48-1	ND	ND	----	----
1,1,2-Trichloroethane	79-00-5	2.9	2.9	2.9	1.1
Benzene	71-43-2	ND	ND	----	----
cis-1,3-Dichloropropene	10061-01-5	ND	ND	----	----
2-Chloroethylvinylether	110-75-8	ND	ND	----	----
Bromoform	75-25-2	ND	ND	----	----
4-Methyl-2-pentanone	108-10-1	ND	ND	----	----
2-Hexanone	591-78-6	740	320,000	15,388	2.8
Tetrachloroethene	127-18-4	30	81,000	1,559	2.2
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	----	----
Toluene	108-88-3	8	5,300,000	1,018	27
Chlorobenzene	108-90-7	31,000	190,000	76,746	3.3
Ethylbenzene	100-41-4	6.8	1,500,000	2,993	5.4
Styrene	100-42-5	11,000	11,000,000	11,000,000	2.3
Total Xylenes	133-02-7	14	6,200,000	11,791	12
SEMI-VOLATILES					
Phenol	108-95-2	12,000	12,000	12,000	1.6
bis(2-Chloroethyl)ether	111-44-4	ND	ND	----	----
2-Chlorophenol	95-57-8	ND	ND	----	----
1,3-Dichlorobenzene	541-73-1	ND	ND	----	----
1,4-Dichlorobenzene	106-46-7	ND	ND	----	----
Benzyl Alcohol	100-51-6	ND	ND	----	----
1,2-Dichlorobenzene	95-50-1	ND	ND	----	----
2-Methylphenol	95-48-7	ND	ND	----	----
bis(2-Chloroisopropyl)ether	39638-32-9	ND	ND	----	----
4-Methylphenol	106-44-5	ND	ND	----	----
N-Nitroso-di-n-propylamine	621-64-7	ND	ND	----	----
Hexachloroethane	67-72-1	ND	ND	----	----
Nitrobenzene	98-95-3	ND	ND	----	----
Isophorone	78-59-1	ND	ND	----	----
2-Nitrophenol	88-75-5	ND	ND	----	----
2,4-Dimethylphenol	105-67-9	ND	ND	----	----
Benzoic Acid	65-85-0	ND	ND	----	----
bis(2-Chloroethoxy)methane	111-91-1	ND	ND	----	----
2,4-Dichlorophenol	120-83-2	ND	ND	----	----
1,2,4-Trichlorobenzene	120-82-1	310	310	310	1.4
Naphthalene	91-20-3	38	69,000	4,254	14
4-Chloroaniline	106-47-8	ND	ND	----	----
Hexachlorobutadiene	87-68-3	ND	ND	----	----
4-Chloro-3-methylphenol	59-50-7	ND	ND	----	----
2-Methylnaphthalene	91-57-6	490	80,000	3,388	13
Hexachlorocyclopentadiene	77-47-4	ND	ND	----	----
2,4,6-Trichlorophenol	88-06-2	ND	ND	----	----
2,4,5-Trichlorophenol	95-95-4	ND	ND	----	----
2-Chloronaphthalene	91-58-7	ND	ND	----	----

TABLE 1-1 (cont.)
SURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
2-Nitroaniline	88-74-4	ND	ND	----	----
Dimethylphthalate	131-11-3	ND	ND	----	----
Acenaphthylene	208-96-8	89	9,600	364	8.8
3-Nitroaniline	99-09-2	ND	ND	----	----
Acenaphthene	83-32-9	360	1,900	720	4.0
2,4-Dinitrophenol	51-28-5	10,000	10,000	10,000	1.6
4-Nitrophenol	100-02-7	ND	ND	----	----
Dibenzofuran	132-64-9	130	2,200	500	5.1
2,4-Dinitrotoluene	121-14-2	ND	ND	----	----
2,6-Dinitrotoluene	606-20-2	ND	ND	----	----
Diethylphthalate	84-66-2	180	1,900	58	1.9
4-Chlorophenyl phenylether	7005-72-3	ND	ND	----	----
Flourene	86-73-7	130	50,000	1,171	20
4-Nitroaniline	100-01-6	ND	ND	----	----
4,6-Dinitro-2-methylphenol	534-52-1	ND	ND	----	----
N-Nitrosodiphenylamine	86-30-6	ND	ND	----	----
4-Bromophenyl phenylether	101-55-3	ND	ND	----	----
Hexachlorobenzene	118-74-1	ND	ND	----	----
Pentachlorophenol	87-86-5	3,700	3,700	3,700	1.4
Phenanthrene	85-01-8	79	50,000	2,249	197
Anthracene	120-12-7	75	25,000	1,328	21
di-n-Butylphthalate	84-74-2	69	26,000	668	61
Flouranthene	206-44-0	82	32,000	1,695	354
Pyrene	129-00-0	51	28,000	1,597	229
Butylbenzylphthalate	85-68-7	ND	ND	----	----
3,3-Dichlorobenzidine	91-94-1	ND	ND	----	----
Benzo(a)anthracene	56-55-3	40	12,000	1,442	99
bis(2-Ethylhexyl)phthalate	117-81-7	310	350,000	6,642	41
Chrysene	218-01-9	65	13,000	1,598	156
di-n-Octylphthalate	117-84-0	300	22,000	1,599	4.7
Benzo(b)fluoranthene	205-99-2	290	7,300	1,944	80
Benzo(k)fluoranthene	207-08-9	66	7,600	1,148	86
Benzo(a)pyrene	50-32-8	170	7,900	1,812	114
Indeno(1,2,3-cd)pyrene	193-39-5	150	6,100	1,122	28
Dibenz(a,h)anthracene	53-70-3	290	1,300	606	7.6
Benzo(g,h,i)perylene	191-24-2	170	5,700	1,594	10
PESTICIDES/PCB'S					
alpha-BHC	319-84-6	63	130	84.6	2.0
beta-BHC	319-85-7	80	510	158	3.8
delta-BHC	319-86-8	ND	ND	----	----
gamma-BHC (LINDANE)	58-89-9	ND	ND	----	----
Heptachlor	76-44-8	ND	ND	----	----
Aldrin	309-00-2	ND	ND	----	----
Heptachlor epoxide	1024-57-3	ND	ND	----	----
Endosulfan I	959-98-8	ND	ND	----	----
Dieldrin	60-57-1	ND	ND	----	----
4,4-DDE	72-55-9	3,600	3,600	3,600	1.5
Endrin	72-20-8	320	320	320	1.4
Endosulfan II	33213-65-9	57	57	57	1.2
4,4-DDD	72-54-8	ND	ND	----	----
Endosulfan sulfate	1031-07-8	ND	ND	----	----
4,4-DDT	50-29-3	ND	ND	----	----
Methoxychlor	72-43-5	ND	ND	----	----
Endrin ketone	53494-70-5	ND	ND	----	----
Chlordane	5103-71-9	ND	ND	----	----
Toxaphene	8001-35-2	ND	ND	----	----
Aroclor 1016	12674-11-2	ND	ND	----	----
Aroclor 1221	11104-28-2	ND	ND	----	----
Aroclor 1232	11141-16-5	ND	ND	----	----
Aroclor 1242	53469-21-9	16,000	16,000	16,000	1.7
Aroclor 1248	12672-29-6	430	1,700	1,031	3.0
Aroclor 1254	11097-69-1	570	570	570	1.4
Aroclor 1260	11096-82-5	ND	ND	----	----

TABLE 1-1 (cont.)
SURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
INORGANICS					
Aluminum		111	75,900	12,113	12,113
Antimony		9.8	267	51	1.5
Arsenic		9.6	37	18	3.4
Barium		42	1,570	177	135
Beryllium		0.5	6.2	2.8	1.7
Cadmium		2.9	32	8.5	5.4
Calcium		2,407	169,000	13,139	13,139
Chromium		21	157	44	4.9
Cobalt		2.97	32	9.1	6.4
Copper		12	2,050	209	119
Iron		131	116,000	8,642	2,066
Lead		1.2	1,380	134	10
Magnesium		579	46,900	6,282	3,964
Manganese		117	4,840	537	385
Mercury		0.2	1.6	0.63	0.15
Nickel		17.9	282	68	54
Potassium		129	3,620	216	93
Selenium		1.1	1.1	1.1	1.0
Silver		3.3	3.3	3.3	1.1
Sodium		165	2,190	592	302
Thallium		ND	ND	----	----
Tin		21	137	44	6.0
Vanadium		8.4	111	27	19
Zinc		23.7	1,100	258	258
Cyanide		1.3	7	3.0	0.22

ND = Not Detected

Note: Surface soil analytical results include data from soil boring samples obtained from a depth of 1 ft.

13436.30
MSR/dlk/TDH/GEA
[skb-400-63]

TABLE 1-2
SUBSURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
VOLATILES					
Chloromethane	74-87-3	ND	ND	----	----
Bromomethane	74-83-9	ND	ND	----	----
Vinyl Chloride	75-01-4	ND	ND	----	----
Chloroethane	75-00-3	ND	ND	----	----
Methylene Chloride	75-09-2	8	200,000	1,659	59
Acetone	67-64-1	32	120,000	1,497	13
Carbon Disulfide	75-15-0	3	3	3	1.1
1,1-Dichloroethene	75-35-4	ND	ND	----	----
1,1-Dichloroethane	75-35-3	ND	ND	----	----
trans-1,2-Dichloroethene	156-60-5	69,000	69,000	69,000	1.7
Chloroform		7	9	8.0	1.4
1,2-Dichloroethane	107-06-2	ND	ND	----	----
2-Butanone	78-93-3	17,000	450,000	87,464	3.1
1,1,1-Trichloroethane	71-55-6	63,000	89,000	74,880	3.1
Carbon Tetrachloride	56-23-5	ND	ND	----	----
Vinyl Acetate	108-05-4	ND	ND	----	----
Bromodichloromethane	75-27-4	ND	ND	----	----
1,2-Dichloropropane	78-87-5	ND	ND	----	----
trans-1,3-Dichlropropene	10061-02-6	ND	ND	----	----
Trichloroethene	79-01-6	970	69,000	15,895	4.3
Dibromochloromethane	124-48-1	ND	ND	----	----
1,1,2-Trichloroethane	79-00-5	ND	ND	----	----
Benzene	71-43-2	19	25,000	3,068	7.4
cis-1,3-Dichloropropene	10061-01-5	ND	ND	----	----
2-Chloroethylvinylether	110-75-8	ND	ND	----	----
Bromoform	75-25-2	ND	ND	----	----
4-Methyl-2-pentanone	108-10-1	41,000	41,000	41,000	1.7
2-Hexanone	591-78-6	9,700	9,700	9,700	1.6
Tetrachloroethene	127-18-4	1,500	250,000	----	----
1,1,2,2-Tetrachloroethane	79-34-5	ND	ND	----	----
Toluene	108-88-3	2	5,300,000	30,629	824
Chlorobenzene	108-90-7	3,600	3,600	3,600	1.5
Ethylbenzene	100-41-4	33	2,700,000	112,296	3,430
Styrene	100-42-5	18,000	2,600,000	160,896	6.0
Total Xylenes	133-02-7	99	7,100,000	504,024	5,088
SEMI-VOLATILES					
Phenol	108-95-2	26,000	26,000	26,000	1.7
bis(2-Chloroethyl)ether	111-44-4	ND	ND	----	----
2-Chlorophenol	95-57-8	ND	ND	----	----
1,3-Dichlorobenzene	541-73-1	ND	ND	----	----
1,4-Dichlorobenzene	16-46-7	ND	ND	----	----
Benzyl Alcohol	100-51-6	ND	ND	----	----
1,2-Dichlorobenzene	95-50-1	ND	ND	----	----
2-Methylphenol	95-48-7	ND	ND	----	----
bis(2-Chloroisopropyl)ether	39638-32-9	ND	ND	----	----
4-Methylphenol	106-44-5	ND	ND	----	----
N-Nitroso-di-n-propylamine	621-64-7	ND	ND	----	----
Hexachloroethane	67-72-1	ND	ND	----	----
Nitrobenzene	98-95-3	ND	ND	----	----
Isophorone	78-59-1	ND	ND	----	----
2-Nitrophenol	88-75-5	ND	ND	----	----
2,4-Dimethylphenol	105-67-9	ND	ND	----	----
Benzoic Acid	65-85-0	ND	ND	----	----
bis(2-Chloroethoxy)methane	111-91-1	ND	ND	----	----
2,4-Dichlorophenol	120-83-2	ND	ND	----	----
1,2,4-Trichlorobenzene	120-82-1	6,200	6,200	6,200	1.5
Naphthalene	91-20-3	38	160,000	22,941	1,128
4-Chloroaniline	106-47-8	ND	ND	----	----
Hexachlorobutadiene	87-68-3	ND	ND	----	----
4-Chloro-3-methylphenol	59-50-7	ND	ND	----	----
2-Methylnaphthalene	91-57-6	450	630,000	42,562	2,963
Hexachlorocyclopentadiene	77-47-4	ND	ND	----	----
2,4,6-Trichlorophenol	88-06-2	ND	ND	----	----
2,4,5-Trichlorophenol	95-95-4	ND	ND	----	----
2-Chloronaphthalene	91-58-7	ND	ND	----	----

TABLE 1-2 (cont.)
SUBSURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
2-Nitroaniline	88-74-4	ND	ND	----	----
Dimethylphthalate	131-11-3	ND	ND	----	----
Acenaphthylene	208-96-8	3,200	10,000	5,657	2.4
3-Nitroaniline	99-09-2	ND	ND	----	----
Acenaphthene	83-32-9	170	100,000	5,766	76
2,4-Dinitrophenol	51-28-5	ND	ND	----	----
4-Nitrophenol	100-02-7	ND	ND	----	----
Dibenzofuran	132-64-9	6,400	78,000	15,675	29
2,4-Dinitrotoluene	121-14-2	ND	ND	----	----
2,6-Dinitrotoluene	606-20-2	ND	ND	----	----
Diethylphthalate	84-66-2	3,800	3,800	3,800	1.5
4-Chlorophenyl phenylether	7005-72-3	ND	ND	----	----
Flourene	86-73-7	280	150,000	9,296	240
4-Nitroaniline	100-01-6	ND	ND	----	----
4,6-Dinitro-2-methylphenol	534-52-1	ND	ND	----	----
N-Nitrosodiphenylamine	86-30-6	ND	ND	----	----
4-Bromophenyl phenylether	101-55-3	ND	ND	----	----
Hexachlorobenzene	118-74-1	ND	ND	----	----
Pentachlorophenol	87-86-5	ND	ND	----	----
Phenanthrene	85-01-8	130	690,000	17,253	3,993
Anthracene	120-12-7	140	81,000	5,534	48
di-n-Butylphthalate	84-74-2	2,700	130,000	14,369	504
Flouranthene	206-44-0	270	248,000	13,460	300
Pyrene	129-00-0	220	140,000	9,864	249
Butylbenzylphthalate	85-68-7	4,400	110,000	28,132	4.6
3,3-Dichlorobenzidine	91-94-1	ND	ND	----	----
Benzo(a)anthracene	56-55-3	180	38,000	4,632	29
bis(2-Ethylhexyl)phthalate	117-81-7	300	1,500,000	25,984	2,047
Chrysene	218-01-9	260	63,000	3,890	94
di-n-Octylphthalate	117-84-0	2,600	110,000	23,707	34
Benzo(b)fluoranthene	205-99-2	190	46,000	5,378	48
Benzo(k)fluoranthene	207-08-9	190	46,000	4,178	12
Benzo(a)pyrene	50-32-8	160	46,000	3,099	37
Indeno(1,2,3-cd)pyrene	193-39-5	150	46,000	2,103	15
Dibenz(a,h)anthracene	53-70-3	46,000	46,000	46,000	1.7
Benzo(g,h,i)perylene	191-24-2	170	46,000	1,616	9.2
PESTICIDES/PCB'S					
alpha-BHC	319-84-6	ND	ND	----	----
beta-BHC	319-85-7	ND	ND	----	----
delta-BHC	319-86-8	ND	ND	----	----
gamma-BHC (LINDANE)	58-89-9	ND	ND	----	----
Heptachlor	76-44-8	ND	ND	----	----
Aldrin	309-00-2	ND	ND	----	----
Heptachlor epoxide	1024-57-3	ND	ND	----	----
Endosulfan I	959-98-8	ND	ND	----	----
Dieldrin	60-57-1	ND	ND	----	----
4,4-DDE	72-55-9	ND	ND	----	----
Endrin	72-20-8	ND	ND	----	----
Endosulfan II	33213-65-9	ND	ND	----	----
4,4-DDD	72-54-8	ND	ND	----	----
Endosulfan sulfate	1031-07-8	ND	ND	----	----
4,4-DDT	50-29-3	ND	ND	----	----
Methoxychlor	72-43-5	ND	ND	----	----
Endrin ketone	53494-70-5	ND	ND	----	----
Chlordane	5103-71-9	ND	ND	----	----
Toxaphene	8001-35-2	ND	ND	----	----
Aroclor 1016	12674-11-2	ND	ND	----	----
Aroclor 1221	11104-28-2	ND	ND	----	----
Aroclor 1232	11141-16-5	ND	ND	----	----
Aroclor 1242	53469-21-9	200	200	200	1.3
Aroclor 1248	12672-29-6	24,000	24,000	24,000	1.7
Aroclor 1254	11097-69-1	190,000	190,000	190,000	1.8
Aroclor 1260	11096-82-5	ND	ND	----	----

TABLE 1-2 (cont.)
SUBSURFACE SOILS ANALYTICAL RESULTS
NINTH AVENUE DUMP
GARY, INDIANA

COMPOUND	CAS REG. NO.	RANGE min ug/kg	RANGE max ug/kg	GEOM. MEAN cmpd detected ug/kg	GEOM. MEAN site wide ug/kg
INORGANICS					
Aluminum		1,143	252,000	4,341	4,341
Antimony		ND	ND	----	----
Arsenic		1.5	320	9.7	3.1
Barium		11	3,190	123	14
Beryllium		1.0	10	2.6	1.2
Cadmium		1.1	24	5.8	2.9
Calcium		714	76,400	7,736	7,736
Chromium		2.7	2,820	80	33
Cobalt		6.8	32	15.8	2.6
Copper		2.7	6,530	82	11
Iron		2,304	57,200	8,149	8,149
Lead		3.8	1,660	206	19
Magnesium		251	14,080	2,655	2,655
Manganese		14	13,441	256	256
Mercury		0.1	0.6	0.22	0.13
Nickel		4.3	383	46	8.2
Potassium		230	2.430	559	61
Selenium		ND	ND	----	----
Silver		2.1	12	4.4	1.8
Sodium		138	1,020	455	12
Thallium		ND	ND	----	----
Vanadium		6.0	306	33	5.7
Zinc		11	2,630	279	68
Cyanide		0.2	4.2	0.92	0.19

ND = Not Detected

Note: Subsurface soil analytical results include data from soil boring samples obtained from a depth greater th- ft. and soil samples obtained from test pits.

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MSR/dlk/TDH/GEA
[dlk-400-23]

TABLE [illegible]-1
[illegible] OF SURFACE WATER AND SEDIMENT ANALYTICAL DATA
[illegible] DATA AND SELECTED [illegible] AND TOXICITY INDICES
[illegible]
GARY, INDIANA

Chemical	Surface Water Concentration (ug/L) FD(2) (t=14)	Surface Water Maximum	Surface Water Mean	Sediment Concentration(1) (ug/kg) FD(2) (t=20)	Sediment Maximum	Sediment Mean	Groundwater Concentration (ug/L) FD(2) (t=74)	Groundwater Maximum	Groundwater Mean	Possible Chemical-Specific ARARs: SQC(3) [illegible]	RCRA MCL(4) (mg/L)	SDWA MCL(5) (mg/L)	CWA AWQC (6) Freshwater Acute (mg/L)	CWA AWQC (6) Freshwater Chronic (mg/L)	Selected Toxicity Indices for (7) Aquatic Species: Species	Index
VOLATILES																
1,1-Dichloroethane	1	2	2	1	23	23	17	2,400	187						Pinperch	TL_m(24 hr): 160 mg/L
Trans-1,2-dichloroethene	1	4	4				16	49,000	1,0[illegible]							
2-Butanone							25	2,100,000	4,6[illegible]						Bluegill	TL_m(24-96 hr): 5640-1690 mg.
1,1,1-Trichloroethane							7	2,800	1[illegible]			0.2			Fathead Minnow	56 hr LC_{50}: 52.8 mg/L
Benzene							28	16,000	1[illegible]	88		0.005	5.3		Bluegill	24-48 hr LD_{50}: 20 mg/L
4-Methyl-2-pentanone							2	630	17[illegible]						Goldfish	74 hr LD_{50}: 460 mg/L
Tetrachloroethene							2	110	11				5.2	0.84	Fathead Minnow	96 hr LC_{50}: 18.4 mg/L
Toluene				11	1,900	156	35	90,000	7[illegible]	420			17		Bass	96 hr LC_{50}: 7.3 ppm
Ethylbenzene							26	6,900	1,003				32		Bluegill	TL_m(25-96 hr): 35.1-32.0 mg.
Styrene															Bluegill	TL_m(96 hr): 25.1 mg/L
Total Xylenes	1	5	5				23	39,000	3,353						Rainbow Trout	96 hr LC_{50}: 13.5 mg/L
SEMI-VOLATILES																
1,2-Dichlorobenzene																
4-Methylphenol				1	640	640	16	11,000	380	27					Carp	24 hr LC_{50}: 21 mg/L
Naphthalene							22	77,000	15[illegible]	8,400					Mosquito Fish	24-96 hr TL_m: 220-150 mg/L
4-Chloroaniline																
2-Methylnaphthalene							20	220,000	129						Brown Trout	48 hr LC_{50}: 8.4 mg/L
Acenaphthylene							2	1,600	80							
Acenaphthene	1	2	2				11	13,000	43				1.7	0.5		
Dibenzofuran							6	52	16							
Fluorene																
N-nitrosodiphenylamine							10	20,000	46							
Phenanthrene				5	4,300	1,105	18	56,000	54							
Anthracene				1	1,500	1,500	13	5,700	16						Trout	no effect level - 5 mg/L, 24
Di-n-butylphthalate				4	730	515	6	16	7				0.94	0.003		
Fluoranthene				6	4,300	1,123	8	12,000	103				3.9			
Pyrene	1	9	9	6	3,700	1,376	12	8,900	26						Mosquito Fish	24 hr TL_m: 2.6 ug/L
Benzo(a)anthracene				1	1,900	1,900	4	1,200	57							
Bis(2-ethylhexyl)phthalate	7	4	3	14	25,000	3,601	23	86	9	560,000						
Chrysene				5	2,300	1,188	5	3,100	115							
Di-n-octylphthalate				4	17,000	2,608	13	62	9							
Benzo(b)fluoranthene				4	2,400	1,070	2	890	171							
Benzo(a)pyrene				2	2,700	1,488	2	970	141	300						
Indeno(1,2,3-cd)pyrene				2	1,500	693	1	7	7							
Dibenz(a,h)anthracene				1	290	290	1	4	4							
Benzo(g,h,i)perylene				1	1,400	1,400	3	610	34							
Aroclor 1248										1.8			0.002	0.000014	Bluegill	96 hr TL_m: 78 ug/L
Aroclor 1254				2	7,400	1,720				3.4			0.002	0.000014	Bluegill	30 day LC_{50}: 0.075 mg/L
Aroclor 1260										42					Bluegill	30 day LC_{50}: 0.177 mg/L
Chlordane				2	5,400	1,294				0.00067			0.0024	0.0000043		
METALS																
Aluminum	8	551	234	20	33,852	3,773	17	1,290	249							
Cadmium	2	6.3	5				19	20	8		0.01	0.01	0.0039	0.0011		
Calcium	14	219,000	70,619	20	121,250	13,481	74	1,060,000	260,976							
Chromium	6	55	10				48	558	23		0.05	0.05	0.016	0.011		
Iron	14	16,100	1,399	20	64,593	9,533	69	178,000	7,764							
Nickel	8	114	32				55	12,500	121		0.013		1.8	0.096		
Silver	6	570	103				20	100	38		0.05	0.05	0.0041	0.00012		
Zinc	11	106	59	20	790	260	73	23,300	1,110				0.32	0.047		

NOTES

1) Sediment samples were only collected during Round 1 sampling.

2) FD - Frequency of detection.

3) Sediment Quality Criteria. Values were estimated using Ambient Water Quality Criteria and the equilibrium partioning approach recommended by EPA. For a more complete discussion of the derivation of these values, refer to the RI (Warzyn, 1988).

4) Resource Conservation and Recovery Act Maximum Contaminant Level. 40 CFR 257. Used to indicate release to groundwater from regulated solid waste management units. MCLs must be met at facility boundary, in general.

5) Safe Drinking Water Act Maximum Contaminant Level. 40 CFR 141. For protection of human health. Concentration limits apply to public and community water supplies.

6) Clean Water Act Ambient Water Quality Criteria. For protection of aquatic life. Levels are established based on evidence of toxic effects to organisms. These are non-enforceable numbers, typically used to establish limits for discharges to surface water.

7) Values obtained from Verschueren, 1983, "Handbook of Environmental Data on Organic Chemicals".

ppm part per million

LC_{50} (lethal concentration fifty) a calculated concentration which, when administered by the respiratory route, is expected to kill 50% of the population of experimental animals. Ambient concentration is expressed in milligrams per liter.

LD_{50} (lethal dose fifty) a calculated dose of a chemical substance which is expected to kill 50% of a population of experimental animals exposed through a route other than respiration. Dose concentration is expressed in milligrams per kilogram of body weight.

TL_m (median tolerance limit) this term has been accepted by most biologists to designate the concentration of toxicant or substance at which 50% of the test organisms survive.

TABLE 1-4
OIL LAYER ANALYTICAL DATA (ug/kg)

	Maximum	Mean
VOLATILES		
1,1-Dichloroethane	160,000	160,000
Trans-1,2-dichloroethene	940,000	64,539
2-Butanone	16,000	16,000
1,1,1-Trichloroethane	1,000,000	1,000,000
Benzene	390,000	290,560
4-Methyl-2-pentanone	540,000	87,533
Tetrachloroethene	120,000	120,000
Toluene	15,000,000	1,108,573
Ethylbenzene	8,800,000	421,908
Styrene	530,000	530,000
Total Xylenes	63,000,000	1,918,905
SEMI-VOLATILES		
1,2-Dichlorobenzene	52,000	50,990
4-Methylphenol	5,700	5,700
Naphthalene	3,700,000	368,039
4-Chloroaniline	220,000	220,000
2-Methylnaphthalene	11,000,000	424,604
Acenaphthylene	500,000	463,681
Acenaphthene	550,000	550,000
Dibenzofuran	630,000	404,722
Fluorene	1,000,000	255,300
N-nitrosodiphenylamine	35,000	15,751
Phenanthrene	3,300,000	433,930
Anthracene	1,600,000	669,328
Di-n-butylphthalate	51,000	48,952
Fluoranthene	960,000	101,186
Pyrene	500,000	75,936
Benzo(a)anthracene	240,000	132,363
Bis(2-ethylhexyl)phthalate	520,000	297,975
Chrysene	230,000	85,631
Di-n-octylphthalate	54,000	54,000
Benzo(b)fluoranthene	180,000	140,712
Benzo(a)pyrene	210,000	122,963
Indeno(1,2,3-cd)pyrene	160,000	78,994
Dibenz(a,h)anthracene	42,000	42,000
Benzo(g,h,i)perylene	170,000	72,595
Aroclor 1248	1,500,000	61,799
Aroclor 1254	79,600	21,854
Aroclor 1260	5,700	5,392
2378 TCDD	ND	ND
Total CDD	530	142
2378 TCDF	4	4
Total CDF	27	13
METALS		
Aluminum	410	410
Cadmium	17	17
Calcium	1,560	1,560
Chromium	920	156
Iron	514	350
Nickel	70	57
Silver	66	66
Zinc	543	189

APPENDIX B
NINTH AVENUE DUMP
GARY, INDIANA
RESPONSIVENESS SUMMARY

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, a public comment period was held from March 20, 1989 to April 19, 1989, to allow interested parties to comment on the United States Environmental Protection Agency's (EPA's) Feasibility Study (FS) and Proposed Plan for a final remedy at the Ninth Avenue Dump site. At a March 29, 1989 public meeting, EPA presented the Proposed Plan for the Ninth Avenue Dump site, answered questions and accepted comments from the public.

The purpose of this responsiveness summary is to document comments received during the public comment period and EPA's responses to these comments. All comments summarized in this document were considered in EPA's final decision for remedial action at the Ninth Avenue Dump site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

Ninth Avenue Dump (and another National Priorities List site, Midco I) is located in Gary near its border with Hammond. A Hammond residential area called Hessville is the closest residential area to the site, approximately 1/8 mile west of the site. Gary and Hammond public officials and Hessville residents have been actively involved with both of these sites.

Community concern intensified in June 1981, when heavy rainfall resulted in flooding from the area around Ninth Avenue Dump and Midco I to the Hessville neighborhood. Several residents complained of chemical odors in flooded basements and chemical burns from contact with flood waters. EPA's Technical Assistance Team sampled flood waters a few days after the flood and analyzed for volatile organics. None were detected.

Hessville residents constructed a dirt dike across Ninth Avenue at the Cline Avenue overpass. The dike is located at the corporate boundary between Gary and Hammond and obstructs traffic between the two communities. The dike remains a source of controversy between Gary and Hammond public officials and residents.

EPA has held several public meetings since the initiation of a preliminary investigation by the site operator in 1983. Results of the Remedial Investigation and the interim remedy Feasibility Study and Proposed Plan were presented in a July 13, 1988 public meeting. The March 29, 1989 public meeting, attended by approximately 25 residents and public officials, focused on the results of the Feasibility Study and the Agency's Proposed Plan for the final remedy. Residents and public officials expressed their opposition to an on-site incinerator at the March 29, 1989 meeting due to concerns about air emissions. Local public officials were also concerned about the Agency's findings that the Indiana Department of Highways (IDOH) was contributing to the groundwater contamination problem and asked that enforcement measures be taken to remediate this problem.

COMMENT:

The Agency has underestimated the rate of infiltration of stormwater. If the Agency had used an estimate of 30 inches per year for infiltration, they would have found that combining deep well injection of groundwater with that to be injected at the Midco I site, would be considerably cheaper than construction of a slurry wall.

RESPONSE:

This question pertains to the interim remedy Record of Decision signed by the Regional Administrator in September 1988. That interim remedy was initiated in order to respond to an immediate threat due to a highly contaminated oil phase floating on the groundwater. At that time no decision had been made regarding use of deep well injection at the Midco I site. Even if that decision had been made at that time, it would have been inappropriate to rely on deep well injection, which will certainly take several months to resolve permit issues, to abate an immediate threat.

In regards to the issue of cost estimates, the June 1988 Phased Feasibility Study assumed that, allowing some unsaturated zone storage, an average maintenance pumping rate of approximately one gallon per minute would be adequate to prevent overtopping of the wall during a three year period.

If more conservative assumptions were used, and no storage of rainwater within the slurry wall was allowed during implementation of the interim or final remedy, an estimate of the average maintenance pumping rate would be 6.75 gallons per minute.

An infiltration rate of 10.64 inches (30% of 35.48 inches per year, annual normal rainfall, Gary, Indiana) over an area of 9.37 acres is considered to be a conservative estimate of average annual conditions. The annual volume associated with these conditions is approximately 360,000 cubic feet per year, which corresponds to an average maintenance pumping rate of 5.1 gallons per minute. The highest average monthly rainfall for Gary is 3.82 inches in June. This corresponds to an infiltration volume of approximately 39,000 gallons, assuming 30% infiltration through the sand, and an average maintenance pumping rate of 6.75 gallons per minute.

As indicated in our response to comments for the Phase I ROD regarding water volumes, the treatment system capacity need not be appreciably different from that used for a 1 gallons per minute average rate, it would simply be operated more frequently.

Assumptions regarding treatment methods and costs are the same as those made in the PFS (Table A-1, PFS Report). The piping and trenching costs are assumed to be the same, and the disposable carbon units cost is increased by the ratio of 5.1:1. The difference in capital cost for water treatment is therefore $197,400 - $38,700 = $158,000. This would represent an increase of 11.1% relative to the capital cost estimated for the first operable unit selected remedy, well within the +30/-50% range of accuracy for Feasibility Study cost estimates.

3. COMMENTS ON COST ESTIMATES

COMMENT:

Incineration costs have been underestimated. On-site incineration costs at similar sites in Illinois were $600+ per cubic yard. The cost estimate makes no provision for solidification of the ash, which will be required if the ash fails the EP Toxicity test or if EPA changes the listing of incinerator ash.

RESPONSE:

Costs of on-site incineration of the excavated waste and soil are based on quotes provided by vendors, and assume the recovered oil will be coincinerated with the contaminated solid materials. Cost estimates for alternatives that involve incineration presented in the FS include mobilization, demobilization, startup, feed preparation, extension of required utilities, and on-site disposal of residuals. Incinerator ash will have to be treated by some means only if it is RCRA characteristic by EP Toxicity and it exceeds standards to be set by the Land Disposal Restrictions. Since these standards have not yet been set, treatment was not included in cost estimate.

Since the "similar site in Illinois" was not named, it is difficult to respond to the cost estimate given in the comment. Actual incineration costs at the LaSalle site in Illinois have been approximately $300 per cubic yard.

COMMENT:

The alternatives considered in the FS do not adequately consider the cost and difficulty of treating groundwater with the high concentrations of salt that exist because of the IDOH facility. The level of treatment is not identified. In particular, the cost and disposal problems are understated with respect to the disposal of the reverse osmosis reject stream. Additionally, in the discussion and selection of a groundwater treatment process, the effects of the salt on treatment process efficiency have not been addressed.

RESPONSE:

Although not specifically discussed in the FS report, the effects of the observed salt concentrations on various groundwater treatment processes under consideration for use at the Ninth Avenue site have been considered. These effects will also become evident in the results of the current treatability studies being conducted by the USACE. Because the reverse osmosis (RO) process is being considered as a polishing process, the reject stream should contain relatively low concentrations of hazardous organic compounds. The costs associated with disposal of the concentrated brine reject stream were based on experience and are considered to be somewhat conservative.

COMMENT:

Alternatives 2 through 6 include destruction of the on-site stored hydrocarbons. However, the cost in Alternative 2 for hydrocarbon destruction has not been appropriately allocated to Alternatives 3 through 6. This distorts the relative cost comparison of the Alternatives.

RESPONSE:

Incineration costs for extracted oil were included in cost estimates for all alternatives (except No Action). It was assumed that under the alternatives that included excavation of waste and soils, the oil would be co-incinerated with the solid material. Therefore, the incremental cost of incinerating the solid materials over that of incinerating the oil only would be smaller than if the oil was incinerated separately from the waste and soil.

COMMENT:

The cost evaluation for all of the alternatives grossly understates several costs. Such costs include the operating and maintenance costs, the costs of pumping and reinjecting for the enhanced flushing option, the cost associated with handling of residual ash and the cost of incineration for destruction of PFS hydrocarbons.

RESPONSE:

Cost estimates for all alternatives were based on vendor quotes, experience from similar projects, and engineering judgment. They are within the level of accuracy the Agency typically expects from Feasibility Studies, and are intended for the purpose of comparison between alternatives. They are not intended to provide the level of accuracy expected from a design cost estimate.

4. OTHER COMMENTS

COMMENT:

The EPA has apparently dismissed in-situ treatment Alternatives based upon a determination that these alternatives are not cost effective. EPA is correct in the determination that they are not cost effective.

RESPONSE:

EPA agrees that in-situ treatment methods are generally not effective in treating the heterogeneous fill materials found at a dump site.

COMMENT:

In order to properly compare alternatives, the level of risk reduction to be achieved by bioreclamation should be compared to that achieved by the preferred alternative (Alternative 3C). Additional data on the treatability of the contaminants of concern should also have been developed. It is likely that the cost of a bioremediation system could be reduced. Additionally, there appears to have been an inadequate and subjective assessment of the in-situ bioreclamation characteristics or the pump-and-treat system, part of the selected Alternative 3. This is demonstrated by the EPA's off-hand comment that soil flushing is part of the selected remedy, although this is not clearly addressed in the Proposed Plan Fact Sheet nor the FS.

RESPONSE:

In-situ bioreclamation was evaluated in the FS and was rejected largely because in-situ treatment methods would likely be ineffective in treating the heterogenous fill materials found at a dump site.

"Soil flushing", as part of the selected remedy, is intended to be an additional benefit of groundwater treatment and not a stand-alone technology application. The soil flushing would occur as a result of groundwater extraction/reinjection, and the soil affected would be the contaminated native soils beneath the fill inside the slurry wall. The flushing is intended to be an incidental benefit of the groundwater treatment system and not an active "percolation-type" soil flushing system designed to affect contaminated source material left in place.

APPENDIX C

ADMINISTRATIVE RECORD INDEX

9TH. AVENUE DUMP, INDIANA

TITLE	AUTHOR	DATE	PAGES
Results from VIAR analyses of samples.	Robert Gnaedinger	81/03/13	20
Sample results from Midco I	Region V TAT to Beverly Kush	82/06/02	17
Preliminary Assessment Ninth Avenue Dump	DMueller - Ecology & Envrnmt	83/02/02	5
Site Inspection Report	EPA	83/08/08	14
US v. Martell, et al. Consent Judgment	US Dist Ct, NW Dist of Ind.	83/09/29	20
Public Meeting Agenda	USEPA Region V	84/12/12	5
Reccommendation of placement of monitoring wells	JStrecker Ind St Bd. of Health	85/02/05	1
An Inventory of the Groundwater Use in the Vicinity of Midco I, Gary, IN	Geosciences Research Assoc.	86/04/00	351
RI/FS Phase I Work Plan	Warzyn Engr. Inc.	86/04/00	303
Final Community Relations Plan	Camp, Dresser, & McKee Inc.	86/07/00	26
Public Meeting of 8/13/86	USEPA Region V	86/08/13	1
Superfund Program Fact Sheet	USEPA Region V	86/08/00	4
EPA Environmental News Release	USEPA Region V	86/08/04	2
Summary of analytical results from resampling wells near Midco I and Midco II, Gary, IN, in July-August 1986	R. Boice-USEPA RPM	86/11/00	33
QAPP	Warzyn Engr. Inc.	86/09/24	438
Memo re groundwater classifications	CHSutfin - EPA	87/01/21	3
RI/FS 9th Avenue Phase II Work Plan, Supplemental Work Plan and Associated Plans.	Warzyn Engineering Co.	87/05/00	[illegible]

01/22/88

9TH. AVENUE DUMP, INDIANA
GUIDANCE DOCUMENTS - NOT COPIED
MAY BE REVIEWED AT EPA
IN CHICAGO, IL

TITLE	AUTHOR	DATE
Remedial Action At Waste Disposal Sites Handbook (revised)		
Policy On Flood Plains And Wetlands Assessments		
Standard Operating Safety Guide Manual		
Superfund Remedial Design And Remedial Action Guidance		
Guidance on Remedial Investigations Under CERCLA		
Superfund Public Health Evaluation Manual		
Interim Guidlines And Specifications for Preparing QAPPs		80/12/29
Community Relations In Superfund Handbook		83/03/00
Guidance on Remedial Investigations and Feasibility Studies		85/[illegible]/00
NEIC Policy Procedures Manual		85/06/00
State Removal Participation in Superfund Remedial Program		84/02/00
Addenda to State Participation in the Superfund Remedial Program Manual		

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NINTH AVENUE DUMP SITE
GARY, INDIANA

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	1	88/03/29	Record of phone conv. with Arthur Carter of IDEM who added to the list of Indiana ARARs the VOC Emmissions Regulations 1325 IAC, 8-1.1-2 and 8-1.1-6 to be added to the list provided in the 2/26/88 letter.	Allison Hiltner-USEPA		Communication Record
	2	85/05/31	Letter requesting reclassification of the Ninthe Avenue Dump Site.	Woodrow Myers, Jr.-ISBH	Valdas Adamkus-USEPA	Correspondence
	2	87/04/30	Letter reflecting the status of Steve Martell's performance of the requirements of the Partial Consent Judgement and his obligations under the same.	Gordan Stoner-U.S.Dept. of Justice	A.Tigne-Cotsirilos&Crowle	Correspondence
	2	87/09/24	Letter to resident enlosing the results of well water tests from his home.	Otis Welch	Allison Hiltner-USEPA	Correspondence
	2	87/10/05	Notification that a prompt remedial action appears necessary.	Dennis Iverson-Warzyn Engineering	Janet Wace-U.S.Army COE	Correspondence
	8	88/02/26	State of Indiana's Applicable or Relevant and Appropriate Requirements (ARARs).	Nancy Maloley-In.Dept.ofEnvir.Mgmt.	Valdas Adamkus-USEPA	Correspondence
	9	88/03/09	General Notice Letter And Information Request	Mary Gade-USEPA		Correspondence
	2	88/04/06	Letter to resident enclosing results of analyses of soil samples taken from her yard.	Allison Hiltner-USEPA	Ms. Mildred Kinley	Correspondence
	12	00/00/00	Ninth Avenue Dump Proposed Plan.	USEPA		Fact Sheet
	2	89/00/00	Fact Sheet	Gasior & Hiltner - USEPA		Fact Sheet
	2	85/03/22	Recommendation that the site	Richard [illegible]-USEPA	Norm Niedergang-USEPA	Memorandum

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NINTH AVENUE DUMP SITE
GARY, INDIANA

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
			be redesignated as a category I site c an explanation of why acceptable implementaion of an RI/FS and remedial actions is very unlikely to be obtained through responsible party actions.			
	1	87/08/24	Review of residential well samples dated 6/12/87.	Loise Fabinski-ATSDR	Allison Hiltner-USEPA	Memorandum
	7	87/09/10	ACTION MEMORANDUM: Removal Request for the Ninth Avenue Dump Site, Gary, Indiana.	Sherry Kamke - USEPA	Valdas Adamkus - USEPA	Memorandum
	21	88/03/07	List of individuals receiving notice/information requests.	USEPA		Other
	8	80/09/26	Complaint in the case of United States v. Steve Martell, et al., #H80-473, U.S.D.C., No. Dist. of Indiana-Hammond Div.	Barbara Magel-USEPA, et al.	Steve Martell, et al.	Pleadings/Orders
	21	84/08/08	Order for entry of Partial Consent Decree be entered as of December7, 1983 and that it be further that defendants Irvin Clark, Donald Clark, Charles O. Clark, Bernice J. Clark, Homer Clark and Dorothy Clark be dismissed with prejudice with Partial Consent Decree attached in the case of United States v. Steve Martell, et al., #H80-473, U.S.D.C., No. Dist. of Indiana-Hammond Div.	Judge James T. Moody		Pleadings/Orders
	26	83/07 25	Hazard Ranking System Scoring Package	[illegible]	Beverly Kush - USEPA	Reports/Studies
	5	83/02/02	Preliminary Assessment	Don Mueller-[illegible] & Envir.	USEPA file	Reports/Studies
	14	83/08/08	Site Inspection Report	Lisa [illegible] & Envir.	USEPA	Reports/Studies

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GARY, INDIANA

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	16	86/09/00	Management Plan Ninth Avenue Dump Site.	U.S.Army Corps of Engineers-Omaha	USEPA	Reports/Studies
	293	87/12/00	Remedial Investigation Of Midwest Solvent Recovery, Inc. (Midco I) Gary, Indiana: Public Comment Draft - Appendices J Through P.	Geosciences and ERM	Midco Trustees	Reports/Studies
	324	87/12/00	Remedial Investigation Of Midwest Solvent Recovery, Inc. (Midco I) Gary, Indiana: Public Comment Draft- Appendices G Through I.	Geosciences and ERM	Midco Trustees	Reports/Studies
	404	87/12/00	Remedial Investigation Of Midwest Solvent Recovery, Inc. (Midco I) Gary, Indiana: Public Comment Draft-Appendices A Through F.	Geosciences and ERM	Midco Trustees	Reports/Studies
	448	87/12/00	Remedial Investigation Of Midwest Solvent Recovery, Inc. (Midco I) Gary, Indiana - Public Comment Draft	Geosciences and ERM	Midco Trustees	Reports/Studies
	166	87/12/16	Request for Applicable, or Relevant and Appropriate Requirements (ARAR).	D. Iverson - Warzyn Engineering	S.Jezrowski-Corps of Eng.	Reports/Studies
	171	88/01/00	Addendum No. 2 Quality Assurance Project Plan (QAPP).	Warzyn Engineering	USEPA	Reports/Studies
	374	88/01/13	Technical Memorandum: Ground water use inventory northeast of Midco I.	Robert Aten-Geosciences Research	R.Ball-ERM North Central	Reports/Studies
	330	88/03/13	Work Plan for Laboratory Treatability Testing Plan.	Greg Asbury-Warzyn Engineering	S.Jezrowski-Corps of Eng.	Reports/Studies
	87	88/05/03	Work Plan for Materials Compatibility Testing	Greg Asbury-Warzyn Engineering	A.Hiltner-USEPA	Reports/Studies

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
	149	88/06/00	Phased Review Draft - Phased Feasability Study Ninth Avenue Dump RI/FS, Gary, Indiana.	Warzyn Engineering Inc.	COE for the USEPA	Reports/Studies
	225	88/06/00	Public Review Draft - Remedial Investigation Report Ninth Avenue Dump RI/FS Gary, Indiana: Volume 2 Tables And Figures.	Warzyn Engineering, Inc.	COE for the USEPA	Reports/Studies
	306	88/06/00	Public Review Draft - Remedial Investigation Report Ninth Avenue Dump RI/FS Gary, Indiana: Volume 1.	Warzyn Engineering, Inc.	COE for the USEPA	Reports/Studies
	366	88/06/00	Public Review Draft - Remedial Investigation Report Ninth Avenue Dump RI/FS Gary, Indiana: Volume 3 Appendix Part 1.	Warzyn Engineering, Inc.	COE for the USEPA	Reports/Studies
	565	88/06/00	Public Review Draft - Remedial Investigation Report Ninth Avenue RI/FS Gary, Indiana: Volume 4 Appendix Part 2.	Warzyn Engineering, Inc.	COE for the USEPA	Reports/Studies

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FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUMENT NUMBER
	12	88/08/03	Letter stating the PRP Group's position with respect to any proposed actions that the USEPA may adopt. Letter also encloses a report prepared by Environmental Resources Management-North Central, Inc. for the PRP's entitled "Analysis Of Public Review Draft Phased Feasibility Study Hydrocarbon Layer Operable Unit 9th Avenue Dump RI/FS Gary, Indiana"	Arthur E. Slesinger-PRP Group	Allison Hiltner-USEPA	Correspondence	
	4	88/09/16	Amendments to the Public Meeting Transcript and a memo from the Court Reporter regarding these corrections.	Marti Shanks-Black & Veatch	Art Gasior-USEPA	Correspondence	
	3	88/08/03	Meeting to discuss PRP concerns regarding the Ninth Avenue Dump Phased Feasibility Study and Proposed Plan (along with attendence list to the meeting held on 7/28/88).	Allison Hiltner-USEPA	File	Memorandum	
	81	88/07/13	Transcript for the Ninth Avenue Dump Public Meeting held on 7/13/88.	Carol Flores-Court Reporter		Other	
	10	87/10/16	On-Scene Coordinators Letter Report CERCLA Removal Action 9th Avenue Dump - Gary, Indiana.	Verneta Simon-USEPA		Reports/Studies	
	345	88/01/00	Endangerment Assessment Ninth Avenue Dump - Gary, Indiana. Supplement Toxicity Profiles.	Warzyn Engineering Inc.	USEPA&Corps of Engineers	Reports/Studies	
	42	88/09/20	Record of Decision	Valdas Adamkus-USEPA		Reports/Studies	

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NINTH AVENUE DUMP SITE
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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	87/08/07	Request that the Indiana Dept. of Highways (IDOH) respond to this letter informing them that their facility is the only probable source for sodium and chloride contamination at the MIDCO I and Ninth Ave. Dump sites. Response should outline the IDOH's proposed plan for remediating the salt contamination.	Valdas Adamkus-USEPA	John Isenbarger-IDOH	Correspondence	1
	2	87/12/14	Outline of the Indiana Dept. of Highways' Consultant's proposed activities regarding MIDCO I and Ninth Avenue Dump.	D.W. Lucas-IN Dept. of Highways	Richard Boice-USEPA	Correspondence	2
	4	88/08/18	Notice that information indicates that the release of hazardous substances, pollutants and contaminants at the MIDCO I and Ninth Ave. Dump Site can be attributed to the Indiana Dept. of Highways (IDOH) facility. This letter is to notify IDOH of potential liability with respect to these sites.	Mary Gade-USEPA	William T. May-IDOH	Correspondence	3
	3	89/01/13	Letter of Intent submitted in accordance with par.III of the Unilateral Sec.106 Order. Listed is the composition of the PRP Committee.	Susan Flieder-Wildman,Harrold,et al	Edward Kowalski-USEPA	Correspondence	4
	1	89/02/14	Additional cost	Allison Hiltner-USEPA	Ninth Avenue Dump	Memorandum	5

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ICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			calculations for the Ninth Avenue Dump Feasibility Study.		File		
	107	88/12/07	Administrative Order Pursuant To Section 106 of CERCLA.	Basil Constantelos-USEPA	Respondents	Pleadings/Orders	6
	15	88/04/00	Scope of Work for The Ninth Avenue Dump Superfund Site Ground Water Treatability Study.	U.S.Army Corps of Engineers		Reports/Studies	7
	14	88/08/15	Scope of Work for The Ninth Avenue Dump Superfund Site Slurry Trench Materials/ Groundwater Compatibility.	U.S.Army Corps of Engineers		Reports/Studies	8
	232	89/01/00	Public Review Draft Full Site Remedy Feasibility Study	Warzyn Engineering	USCOE & USEPA	Reports/Studies	9
	20	89/01/18	Health Assessment	ATSDR	USEPA	Reports/Studies	10
	21	89/03/00	Proposed Plan Ninth Avenue Dump Gary, Indiana.	USEPA		Reports/Studies	11

Several oral comments were accepted at the public meeting. EPA received three written submittals during the public comment period, one from a local public official and two from Potentially Responsible Parties (PRPs).

III. SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

The comments are organized into the following categories:

A. Summary of comments from the local community

1. Comments on the Feasibility Study and Proposed Plan
2. Other comments

B. Summary of comments from Potentially Responsible Parties

1. Comments related to risk assessment
2. Comments on integration of the interim and final remedies
3. Comments on cost calculations
4. Other comments

The comments are paraphrased in order to effectively summarize them in this document. The reader is referred to the public meeting transcript and written comments available at the public repository for further information.

A. SUMMARY OF COMMENTS FROM THE LOCAL COMMUNITY

1. COMMENTS ON THE FEASIBILITY STUDY AND PROPOSED PLAN

COMMENT:

Incineration is not a viable alternative for the cleanup of Ninth Avenue Dump. New combinations of chlorinated compounds, including dioxins, may be formed during the incineration process, which would then be released through air emissions or through disposal of ash. Heavy metals would not be treated by incineration and would remain in the ash.

There are alternative remediation technologies currently available which would be significantly cheaper than incineration. (The commenter provided a copy of a paper entitled "GE's Non-Sodium Process for Chemically Decontaminating Mineral Oil Dielectric Fluid" as an example alternate technology.)

RESPONSE:

Dioxin concentrations measured in soil samples were extremely low (less than one part per billion) in soil and oil samples. Dioxin precursors, those compounds which might combine to form dioxins, were also found at extremely low concentrations, making the likelihood of dioxin formation during incineration extremely low. Studies have shown that chlorine is preferentially converted into hydrogen chloride (HCl) gas during the incineration process. Emissions of HCl will be monitored to ensure EPA emissions standards (described below) are met.

The alternate technology provided by the commenter is known within the industry as the "KPEG" process. This technology was evaluated during the development of the Feasibility Study, and was found to be of limited application for the following reasons: 1) the process is not appropriate for wastes contaminated with multiple compounds, and further treatment would be required, and 2) this process has been applied to waste oils, but not to solids treatment.

COMMENT:

The City of Hammond has an incinerator regulation which prohibits burning waste which may result in generation of dioxins, furans, chlorine, and hydrochloric acid (HCl) in incinerators within the City of Hammond. These standards should be applied to the incinerator at Ninth Avenue Dump. Stack tests should be done in worst case conditions and in-stack monitoring should be done for furans, hydrochloric acid and other toxic substances.

RESPONSE:

Since this mobile incinerator will be operating in the City of Gary, EPA cannot consider the City of Hammond's incinerator regulation an applicable, or relevant and appropriate requirement. However, although EPA cannot promise no emissions of the substances listed above, stringent standards set by the RCRA, TSCA and Superfund programs will be enforced for incinerator emissions. These include the following standards:

1) Each principal organic hazardous constituent in the waste must be reduced to .01% of the original concentration before emission into the air. The RCRA program refers to this as 99.99% destruction and removal efficiency (DRE). Some more toxic compounds, including PCBs, must be reduced to .0001% of the original concentration, or 99.9999% DRE.

2) HCl emissions, if greater than 4 pounds per hour, must be reduced by 99%. Emissions of particulate matter may not exceed 0.08 grains per dry standard cubic foot.

3) In addition to the above regulations, a standard has been set in this Record of Decision (ROD) to limit emissions of hazardous substances in air resulting from all cleanup activities to less than 1×10^{-6} (one in one million) cumulative carcinogenic risk at the site boundary.

COMMENT:

A public meeting should be held after the results of a stack test are available and before the incinerator is in full scale operation to inform the public and discuss the results of the test.

RESPONSE:

This is an excellent suggestion and EPA will make every effort to accommodate this request.

2. OTHER COMMENTS

COMMENT:

All hazardous waste sites in northwest Indiana should be addressed in a comprehensive manner instead of a piecemeal approach. Remedial actions should concentrate on creating usable sites when they are completed.

RESPONSE:

EPA agrees that a comprehensive approach would be the best way to deal with all of the hazardous waste sites in northwest Indiana. To that end, EPA is recommending remedial action for the Ninth Avenue Dump site concurrently with the nearby Midco I and Midco II Superfund sites, to ensure that these three sites will be addressed in a consistent manner. EPA and IDEM have initiated studies to assess overall contamination problems in the Calumet Aquifer and the IDEM is in the process of developing a remedial action plan for the Grand Calumet River/Indiana Harbor Canal area. It is EPA's hope that these regional studies can be used to ensure that all of the major contamination problems in northwest Indiana are addressed in a consistent manner.

In response to the second portion of the comment, EPA agrees that the ideal approach would be to leave a completely usable site after remedial action. Unfortunately, the large volume of contaminated materials at this site makes the attainment of this goal extremely difficult. EPA must take a number of considerations into account when a final remedial action including protectiveness, long term effectiveness, implementability, and cost. Since EPA has determined that it would be extremely difficult to clean up 100% of the contaminated materials on the site, the selected approach combines partial treatment with partial containment and deed and land use restrictions to provide added protection to present and future area residents.

COMMENT:

IDEM should take action against the Indiana Department of Highways (IDOH) regarding the release of contaminants from their Gary Subdistrict road maintenance facility.

RESPONSE:

IDEM has informed EPA that it is currently conducting discussions between their office, the IDOH and the Governor's office, focusing on the most appropriate method to remediate the salt contamination and establishing a funding mechanism to pay for the cleanup, in an effort to resolve this issue as quickly as possible.

COMMENT:

EPA should have a toll free number and should have a regional office in northwest Indiana so that cleanups may be implemented more quickly.

RESPONSE:

EPA does have a toll free number for reporting spills or other releases of hazardous substances under the purview of the Superfund program. That number if 800-621-8431. The regional office in Chicago is easily accessible to northwest Indiana.

B. SUMMARY OF COMMENTS BY POTENTIALLY RESPONSIBLE PARTIES

1. COMMENTS RELATED TO RISK ASSESSMENT

COMMENT:

The significant public health risks associated with the current use scenario are due to trespassing on the site. Because there is no basis provided in the FS or the RI for the frequency of trespassing nor the degree of contact with each contaminated media, this violates any rational concept of risk assessment procedure, and, therefore, is invalid. It is noteworthy that none of the risks significantly deviate from 10^{-4}, even with the unrealistic and speculative assumptions embodied in the calculations.

RESPONSE:

Assumptions for trespassing rates were based on information provided by local residents, numerous observations of trespassers during field work at the site, and professional judgment. Given that the site fence has been vandalized several times and there are spent shot gun shells on-site, there is ample reason to believe that trespassing occurs on-site.

Although the highest carcinogenic risk associated with trespassing is 7.5×10^{-4}, far higher carcinogenic risks (greater than 1 for ingestion or dermal contact with groundwater) are associated with future use of the site if no further action is taken to mitigate risks.

COMMENT:

The concept of residual risk is based on the assumption of unrestricted development of the site, which cannot be supported. This approach results in a presumption that institutional controls have no value or reliability. This assumption severely penalizes remedies that mitigate risk with the reasonable use of institutional control versus remedies that achieve arbitrary numerical risk levels in all media without such reliance. This concept constitutes a major flaw in the FS and should be corrected prior to issuance of the ROD. Institutional controls are, in fact, appropriate at this site, as recognized by EPA in its elected preferred remedy, as described in the Fact Sheet.

RESPONSE:

The National Contingency Plan requires that Feasibility Studies compare remediation alternatives against a no action alternative. It is Agency policy that risks calculated for the no action alternative presume no institutional controls. A fence constructed by EPA in 1987 to restrict access has been frequently vandalized, indicating that institutional controls alone would be ineffective in eliminating risks at the site. EPA agrees that institutional controls would be an effective component of a full site cleanup, and have included them in every alternative except no action. However, there is no doubt that EPA prefers remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous substances, pollutants, and contaminants.

COMMENT:

The risks associated with the future use scenario have been grossly overstated because they assume contact with the most contaminated media in both soil and groundwater simultaneously and assume unrestricted residential development of the site. However, EPA has stated that the site is not suitable for residential development. This site is also a wetlands area, which limits access. The Clean Water Act (Section 404) would further restrict future use development. EPA has failed to establish a basis for assuming unrestricted growth for purposes of its risk assessment.

RESPONSE:

The maximum and average contaminant concentrations were used to characterize risks. Average concentrations in each medium were used to characterize the risk associated with each alternative.

A residential use scenario was used to estimate worst case future use risks, because the area has been developed for residential use within 1/8 mile of the site, and a residence adjacent to the site was inhabited until the early 1980's. Given the extremely high risks associated with residential use, an industrial use scenario would have also shown substantial risk due to contact with soils and groundwater.

EPA has not stated that the site is not suitable for residential development, except in the sense that the present gross contamination of the site precludes safe residential use. The Clean Water Act would not restrict future use of most of the site, since it has already been filled.

COMMENT:

The FS does not accurately characterize or evaluate the no action alternative. Reference should be made to the Phase I RI/FS for a discussion of the no action alternative. The FS fails to evaluate "no action" in Phase II in light of work completed in Phase I (the interim remedy). Thus, the FS fails to reflect accurately the actions taken during the PFS Remedy nor does it reflect the long term institutional controls and groundwater monitoring system that are stated to be part of the no action alternative.

RESPONSE:

The No Action alternative did not assume any institutional controls, as the only institutional controls included in the ROD for the Phase I remedy were temporary security measures during the implementation of the interim remedy. No Action does, however, assume the facilities identified in the ROD are in place as a baseline condition to the FS. Chapter 3 of the FS and Section IV of this ROD describe the risks remaining after implementation of the Phase I remedy.

COMMENT:

EPA has used different assumptions of the level of risk reduction that is desired in comparing remedial alternatives. If other remedial options were compared on an equivalent basis, other alternatives, such as the no action alternative and Alternative 2, would have compared more favorably to Alternative 3C. Accepting the fact that EPA's remedy will involve institutional controls, the no action alternative (including completion of Phase I work) or Alternative 2 would compare more favorably.

RESPONSE:

EPA used risk reduction calculations to compare different excavation scenarios on a relative basis, and to compare in-situ versus direct groundwater treatment methods. For the most part, EPA used a qualitative assessment of protectiveness to compare across alternatives, since it was not possible to fully quantify the risk reduction provided by each Alternative.

Protectiveness is only one of several criteria EPA uses in remedy selection. The no action alternative was rejected because it provided no protection against exposed contaminated surface soils, among other reasons. Alternative 2 was rejected mainly because it did not provide adequately for long term effectiveness in prohibiting migration of contaminated groundwater, and not because it compared unfavorably to Alternative 3 in short term protectiveness.

COMMENT:

Alternative 2 (capping, oil incineration, and institutional controls) in addition to the Phase I remedial action, will eliminate risks to trespassers. EPA rejected institutional controls on the premise that the site will be subjected to unrestricted residential development, yet the final remedy includes restricted use of the site. It would be more appropriate to fence the site and restrict its use.

RESPONSE:

EPA did not reject the use of institutional controls at the site, and in fact these are part of the selected remedy. EPA rejected Alternative 2, not because it did not provide protectiveness in the short term, but because it did not provide for adequate long term effectiveness in controlling groundwater contamination. An alternative solely relying on institutional controls and implementation of the Phase I remedy was not included in the final list of alternatives because, aside from the fact that long term risks due to contaminated groundwater would be inadequately addressed, this would leave an unacceptable risk due to contact with contaminated surface soils to trespassers.

COMMENT:

Alternative 2 has been characterized in the FS as being "somewhat more protective than Alternative 1." In fact, Alternative 2 is highly protective of human health and the environment and effectively mitigates all risks from the site in all media. This level of risk reduction is not apparent in the FS because of the erroneous assumptions used in calculating risk, such as the assumption that contamination was evenly spread throughout the area within the slurry wall. Thus, a determination that the slurry wall with cap, access control, and collection of contaminated sediments and pond debris as well as destruction of the majority of the on-site contamination (that associated with the collected hydrocarbons) is merely somewhat more protective than the no action remedy indicates an arbitrary bias on the part of the EPA for a remedy that theoretically restores the site to a condition suitable for unrestricted development.

RESPONSE:

Protectiveness is only one of several criteria used by the Agency in remedy selection. The primary reason Alternative 3 was selected over Alternative 2 was not protectiveness in the short term, but rather because Alternative 3 provides superior long term effectiveness in preventing migration of contaminants in groundwater.

COMMENT:

The risk reduction calculations for various levels of removal of contaminated soils that were assessed under Alternative 3 were based only on the removal of the contaminants and, therefore, did not accurately quantify risk that will remain associated with contaminants present inside or outside the slurry wall.

RESPONSE:

Risk reduction calculations were presented in the full-site FS for groundwater and waste/soils inside and outside the slurry wall, and were based on pathways of exposure to each environmental medium.

COMMENT:

The FS indicates, under Alternative 3, that the calculation of residual risk was based on an assumed percentage of contaminant removal equated to a percentage of soil volume removed. This assumes that the contamination is evenly spread over the entire volume of contaminated soil found inside the slurry wall. This procedure does not adequately address the operating history during which the wastes were used to fill in the spaces between the natural dunes at the site, or the "hot spots" that were identified during the RI.

RESPONSE:

Residual risks following waste and soil excavation were based on the assumption that the excavated soils were at an average contaminant concentration which was calculated from available analytical data. This assumption is conservative in that the waste and soils that would be removed under excavation Scenario C would be at a much higher contaminant concentration due to their direct contact with the oil layer. The actual risk reduction resulting from implementation of Scenario C would likely be substantially higher than that presented in the FS.

COMMENT:

The evaluation of the alternatives is inconsistent with the evaluation of the selected remedy proposed by EPA. In the FS the risk-reduction scenarios under Alternative 3 were fully developed. All other alternatives were compared against the subalternative 3B, which achieved the greatest level of risk reduction. This procedure understates the effectiveness of the other Alternatives.

RESPONSE:

It was not possible to fully quantify the risk reduction provided by each alternative. Some calculations were done to allow comparison of the three excavation scenarios in Alternative 3, but Alternatives were compared against each other largely on the basis of a qualitative assessment of the relative risk reduction provided by each alternative. In addition, Alternative 3C was selected because it provided the best balance of all of the nine criteria considered by EPA in remedy selection, not just on the basis of protectiveness.

COMMENT:

The Agency has arbitrarily chosen to burn 35,000 cubic yards of what it believes to be the worst materials on-site, at an exorbitant cost. The remaining material will still have a risk greater than 10^{-4}. The

EPA's documents point out that burning 100% of the contaminated material would be economically impractical. Partial treatment is being done only to satisfy the SARA preference for treatment.

RESPONSE:

The residual risk due to contaminated soils after implementation of Alternative 3C was estimated in the Feasibility Study to be 5.9×10^{-4}. For this reason, further protection through a RCRA cap is included in the selected remedy. Due to limited data on distribution of contaminants in subsurface soils, several conservative assumptions were used in order to simplify risk calculations. The assumption made in the FS was that contaminants are distributed evenly through subsurface soils. In reality, the 35,000 cubic yards of highly contaminated material would likely be at concentrations of contaminants in excess of the assumed average concentration, making the assumed risk reduction value a conservative estimate. The actual residual risk after excavation and treatment of this material would likely be substantially less than the estimated 5.9×10^{-4}.

The selected alternative was not chosen solely in order to satisfy the SARA mandate for "treatment to the maximum extent practicable", as the commenter suggests. Rather, the selected remedy was chosen because a combination of partial treatment and containment would, in the Agency's judgment, attain a high level of protectiveness and long-term effectiveness.

COMMENT:

The proposed remedy includes flushing the site with recirculating groundwater. However, the Feasibility Study implies that this is senseless because the overall risk would not be reduced below the 10^{-3} risk level after 20 years. Containment would accomplish the same risk reduction at 20% of the cost.

RESPONSE:

The Agency did not independently evaluate flushing contaminated soils with recirculating groundwater as part of the preferred remedy. "Soil flushing", in this case, has been discussed as an additional benefit of the groundwater treatment portion of the proposed remedy and not as a stand alone technology. It is unclear what the commenter is referring to in the statement about risks not being reduced below the 10^{-3} risk level, since the Agency did not evaluate risk reduction associated with soil flushing in Alternative 3C. It appears that the commenter is referring to the discussion of the risk reduction due to the in-situ groundwater treatment technology proposed in Alternative 4, not soil flushing.

The Agency does not dispute that partial treatment will accomplish the same risk reduction as containment in the short term. The partial treatment solution was selected because it is superior in long term effectiveness to a solution relying only on a cap and slurry wall, which will almost certainly require long term maintenance and possibly replacement to ensure future protectiveness.

COMMENT:

The FS indicates the presence of salt presents a significant risk at the site, but does not clearly indicate that the salt is part of a massive salt plume underlying the area and emanating from the adjacent Indiana Department of Highways (IDOH) salt storage facility. The document also states that the PCB risk is not believed to be representative of the site; however, it has been included in the calculation of risk.

RESPONSE:

It is true that the salt beneath the site is part of a large plume that appears to emanate from the IDOH facility. PCBs were detected in groundwater at a single off-site location, and at a concentration in excess of the solubility limit for PCBs in water. This sample was therefore not considered to be representative of the site, and PCBs were not considered in the risk analysis for groundwater. However, PCBs were detected in the oil, waste and soil on-site. Risks due to PCB contamination in oil, waste and soil were included in the risk analysis for the site.

2. COMMENTS ON INTEGRATION OF THE INTERIM AND FINAL REMEDIES

COMMENT:

The final remedy decision is not necessary at this time because an operable unit remedy is currently being implemented. The final remedy decision would benefit from information collected during implementation of the first operable unit. Further, EPA has failed to show a need for the Phase II work.

RESPONSE:

The PRP steering committee stated in a December 27, 1988 letter in response to the Unilateral Administrative Order for the first operable unit that it was unreasonable to require PRPs to implement the first operable unit when there were several unknowns relating to the final remedy. At that time they requested that the implementation of the first operable unit be delayed until the final remedy decision was made. EPA tried to accommodate the PRPs as much as possible by moving forward on schedule with the final remedy ROD. Now EPA is being asked to delay the final remedy ROD until after implementation of the interim remedy. EPA agrees with the PRPs' initial position that knowledge of the final remedy decision will enhance their performance of the Phase I remedial action.

In response to the second comment, that EPA has failed to show a need for the Phase II work, Chapter 3 of the final remedy FS describes the substantial risks remaining after implementation of the interim remedy.

COMMENT:

The final remedy FS requires consistency with the selected Phase I remedy as a general constraint on the development of the final site alternatives. A major comment of the PRPs was the selection of the technologies for the Phase I remedy. In response to many of the major comments, the EPA stated that a significant basis for selection of any of the Phase I technologies was that it would be consistent with the final site remedy. It is apparent that the EPA has been engaging in circular reasoning, which can be used to justify any selection of technology, and the technologies considered in the FS do not, in fact, maintain consistency with the remedy. Several of the alternatives (e.g., site-wide incineration) constitute a virtual abandonment of the slurry wall that has been specified for the Phase I remedy.

RESPONSE:

The selection of the slurry wall in the Phase I remedy was based on several factors which considered both the Phase I remedy and the anticipated full-site remedies. The benefits of a slurry wall in implementing the Phase I remedy have been discussed in the June 1988 Phased Feasibility Study. Additional benefits of the slurry wall in implementing the full-site remedy include:

- The presence of the slurry wall will greatly reduce the quantity of groundwater requiring treatment during groundwater remediation, since the flow of relatively clean groundwater into the area of highest contamination would be restricted; and

- The slurry wall would serve to prevent migration of residual contamination over the time in which the full-site remedy is being implemented.

- The selected remedy treats only a portion of the contaminated soils, and leaves approximately 65,000 cubic yards of contaminated soils in place, mostly below the water table. Containment reduces the possibility of migration of these residual contaminants.

These benefits, as well as the benefits of a slurry wall to the Phase I remedy, were considered in selecting the technology, the materials of construction, and the placement of the barrier around the area to be contained. An additional consideration in selecting the slurry wall as a Phase I technology, was that it be consistent with the technologies under consideration for the full-site remedy. The selection of the Phase I remedy is, in fact, consistent with the alternatives developed for the full-site remedy, none of which would require abandonment of the slurry wall implemented as part of the Phase I remedy.

COMMENT:

The slurry wall cannot be justified as necessary to contain groundwater, based upon the EPA's assessment of risk and groundwater mobility.

RESPONSE:

Containment of groundwater is not the sole justification for the slurry wall. The primary intent of the slurry wall is to enhance the recovery of oil during the Phase I remedy. In addition, the slurry wall is intended to reduce the quantity of groundwater requiring treatment during the full-site remedy, and to contain residual contamination after implementation of the full-site remedy.

COMMENT:

The FS fails to discuss adequately the implementation problems associated with excavation of material from within the slurry wall that will have been constructed as part of the PFS Remedy. The integrity of the PFS slurry wall was a major item of comment by the PRPs (See Reference 4) and, at that time, the EPA indicated a recognition that slurry walls do not possess structural strength sufficient to resist differential earth pressures. The extensive excavation contemplated by several of the FSR alternatives may be infeasible because of the presence of the soil-bentonite slurry wall and could require implementation of the remedies in a different sequence.

RESPONSE:

A list of references was not provided with PRP comments, however, it is inferred from statements in the comment letter that Reference 4 is the Agency's September 1988 Record of Decision. As is reflected in the responsiveness summary attached to that ROD, the integrity of the slurry wall was, in fact, not mentioned by the PRPs as an issue during the public comment period, nor did EPA indicate in that document a recognition that slurry walls do not possess structural strength sufficient to resist differential earth pressures.

The location of the slurry wall as presented in the Phase I and Phase I FS reports, is tentative and based on available site data. As discussed in the Phase I remedy FS, the actual location of the slurry wall will be based on additional subsurface data which is to be collected during the design phase for the Phase I remedy. The final location of the slurry wall will be selected to avoid disposal areas, avoid filling wetlands as much as possible, and to avoid contact with the oil layer. The wall will be located such that possible excavation of fill material as part of the full-site remedy would not compromise the integrity of the slurry wall.